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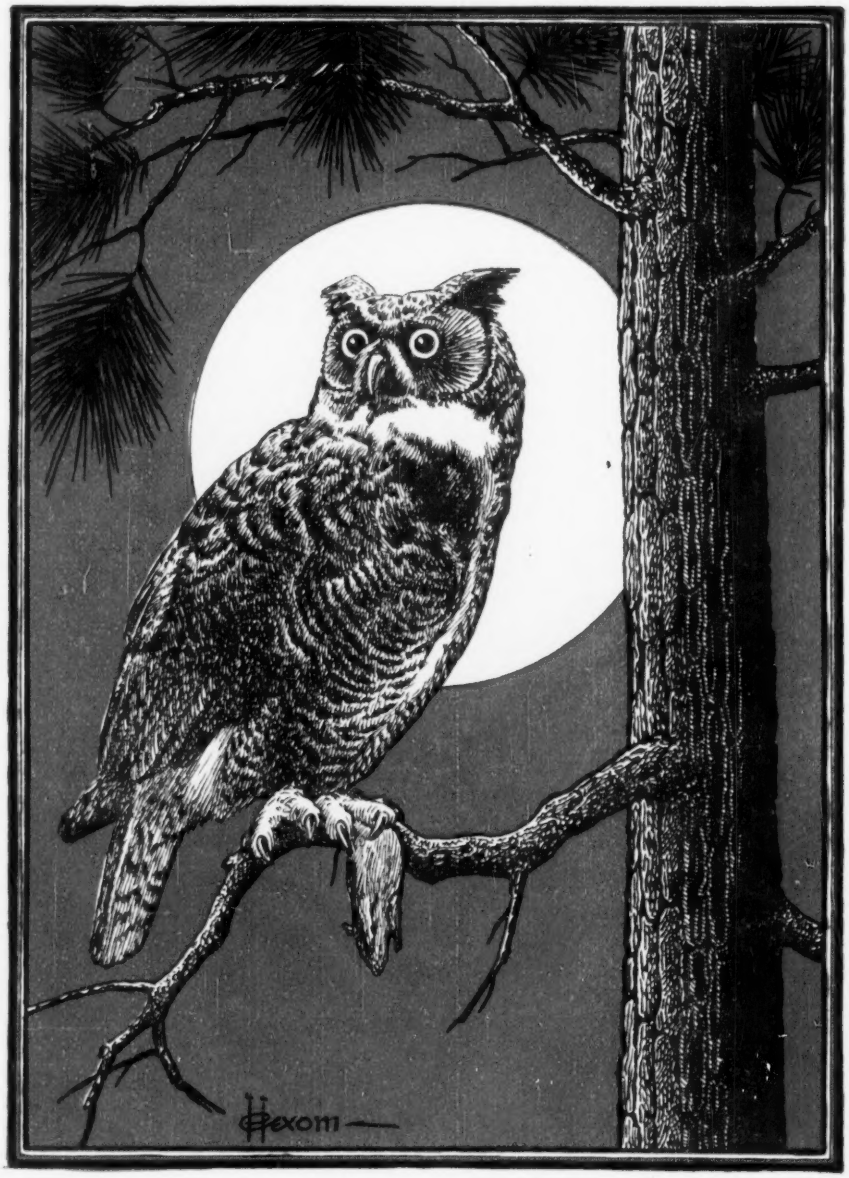

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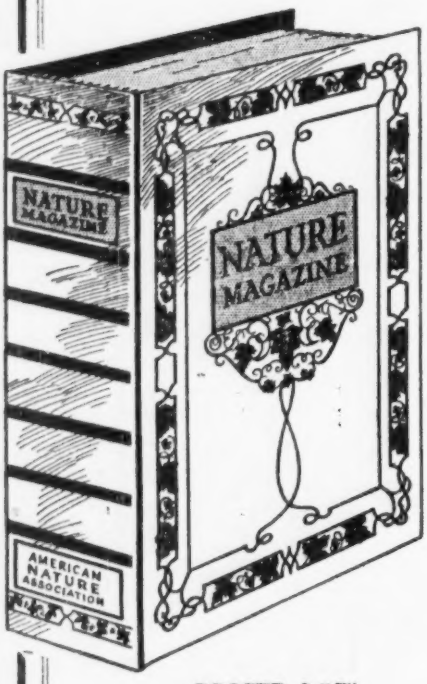

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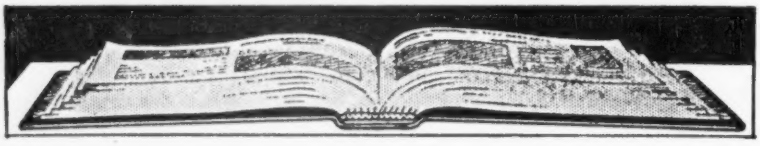

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Nature in Print

By HOWARD ZAHNISER

A QUARTER of a century ago—in the spring of 1928—Ernest Thompson Seton saw the publication of the final volume of his *Lives of Game Animals*, a work that ever since has been an essential part of our wildlife literature. For some time it has been out of print, and even in second-hand book stores probably more sought than found. Now, once again, it is in print, republished from the same plates used for the original edition, and the event is one worth reporting with some emphasis.

The work is actually in eight volumes, for each of its four so-called "volumes" is in two books. Cats, wolves, and foxes are described in the two volumes of Volume I; bears, coons, badgers, skunks, and weasels in Volume II; hoofed animals in Volume III; and "rodents, etc." in Volume IV. Altogether there are 104 lives, the scope of the work—and its interest—being broader than the title "game animals" might seem to imply. Seton himself, in a lengthy subtitle, explained that the work is *An account of those Land Animals in America, north of the Mexican Border, which are considered "Game", either because they have held the Attention of Sportsmen, or received the Protection of Law.* Thus arbitrarily defined, the term "game" serves Seton's title purpose, although to many it may seem to be an unfortunate misnomer.

I would surmise that nearly all Americans of this century who have become concerned with wildlife have had interesting experiences with Seton's writings, and for many these writings have been important influences—the writings, together of course with Seton's illustrations, which have always accompanied them. The illustrations include not only pioneer photographs of many of the animals but, most notably, drawings and sketches from Seton's own easel. I first read these *Lives* in Edward A. Preble's library, and I last read from them (before receiving these review volumes) in Adolph Murie's library, where my young son Edward and I sought out Seton's life of the beaver to reassure ourselves about the factual basis of a beaver story we were reading aloud. (We found that Seton's life contained, with its drawings, so much fascination as to eclipse the fiction for that evening.) It is good to know that, now reprinted, these *Lives* can continue to enhance the libraries of those interested in animals.

Seton's own first success as a writer (and illustrator) was with animal stories contributed to magazines and collected in that great volume that so many of us have enjoyed over and over again—*Wild Animals I Have Known*, first published in 1898. He himself later described this work as having "founded the modern school of animal stories; that is, giving in fiction form the actual facts of an animal's life and modes of thought." To this work, and its phenomenal success, we owe the later publication of the *Lives*. Within three weeks after its October publication the first edition of 2000 copies of *Wild Animals I Have Known* was all sold. Before Christmas of 1898 there were three more large printings. The book became a best seller, and Seton tells us, in his autobiography *Trail of an Artist-Naturalist*, that "this boom did not die out for several years" but left him "in easy circumstances." The *Lives*, which Seton in this same autobiography called his "most ambitious undertaking," were written to answer critics of his animal stories who had attacked their reliability " as natural history." That was half a century ago. President Theodore Roosevelt, whom Seton describes as his "friend and backer," urged him to publish his facts, protesting "People do not dream of how many facts you have back of your stories." His subsequent experience in "publishing the facts" Seton summarizes as follows in his autobiography:

"I set to work to do so; and after three years got out my scientific work, *Life Histories of Northern Animals*, in two quarto volumes. This was acclaimed as a masterpiece. For this I was awarded the Camp-Fire gold medal, for the most valuable contribution to popular natural history of the year. It was, however, merely the prodrome of my *Lives of Game Animals*, which came out ten years later in four large quarto volumes, and for which I got the Burroughs Medal of the Elliott Gold Medal of the National Institute of Science."

The first of the volumes appeared originally in 1925, the later ones in 1926, 1927, and 1928. In a preface "On Going to Press" in the final volume Seton reviewed the origin of the work and further testified that during the period from 1919, when he had "definitely abandoned all other pursuits" to complete the *Lives*, he had "written no other book, done little lecturing, taken no holidays, gone on no expeditions." "My every day and every hour," he continued, "has been devoted to the one work; until now, after eight years, it is complete—text, maps, and illustrations all from my own hands."

Nevertheless, Seton hastens to add, the Biological Survey, the National Museum, and the American Museum gave him "every help and every encouragement." The list of those in his acknowledgements who "have freely and cheerfully given me their best information and the benefit of their life-long training as naturalists" is a roster of the great mammalogists who were Seton's contemporaries. "This, in effect," as Seton himself boldly declared, "guarantees the authenticity of all facts submitted—a guarantee that, in its fullness and force, has never before been equalled in a popular natural history."

At the basis of Seton's success was, of course, his own intense and intimate experience with animals in the wild. In an incidental paragraph to one of his accounts he once said: "For long my theory of life has been to take two trips into the wilderness each year and spend six months on each trip." He did not fully succeed in applying this theory, but he did have a life rich in direct experience in the outdoors. He had a deep sympathy with wild creatures and a keen intellectual curiosity. He was a talented artist with a flair for drawing pictures of animals. He was a story teller. Add to these qualities his regard for the esteem of scientists, his love of truth, and his literary sense—all touched with an appreciation of fame—and the sum certainly equals the authorship of these notable books called *Lives of Game Animals*.

Despite his literary sense and his skill so often demonstrated in his tales of fashioning a form for his writings, he made his *Lives* inclusive, diverse, and detailed rather than selective and unified. He tells us that he "considered each animal under some five hundred lights," using a schedule of some five hundred questions that he made for this purpose as early as 1898. He does not tell us all these questions, although it would be interesting to know them. (What intelligence it is in any field to be able to ask 500 questions!) He does list for us some three dozen heads, under each of which he says he asks in turn, "What do we know of it in this department, or how far has it progressed along these lines?" Rich in quotations from others, the resulting assembly of information is indeed a wealth of natural history. And it comes to us, item by item, as though spontaneously from one in conversation: Nomenclature, description, speed, tracks, scatology, mind, environment, range, maps, home range, migrations, numbers, food, property, storage habits, relation to light, sociability, means of communication, senses,

The Outlaw

By MAE NORTON MORRIS

At the tattered edge of the autumn wood
One perfect moment, alert he stood;
One breathless moment of sharp surprise,
A little red fox with furtive eyes.

Soft as the whisper of falling snow
Brushing the hills when the wind is low,
I called to him, but he slipped away
Into the foil of his friendless day,

And over the crisp wood's painted rim
My heart still wanders in search of him.

The Personal Notes of a Great Naturalist

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To anyone who knows the pungent charm of his previous book, *A Sand County Almanac* (which the *N. Y. Times* called "outdoor writing at its best"), ROUND RIVER will come as a new delight—full of wisdom and humanity, a record of reflections on all aspects of nature by a man who loved it and lived with it.

The daily entries in his journals were written in camp on his field trips—hunting, fishing, exploring; many of them indicate the source of his ideas on land ethics. The longer essays are taken from contemplative notes, which were still in manuscript when he met his tragic death fighting a grass fire.

Every page retains something of his personality. Taken together they reveal the growth of his extraordinary perception about man and nature, the difference between land and country, the lessons of natural history, the pleasure in the sight and pursuit of game, the meaning and use of leisure. To read ROUND RIVER is to share the companionship of a knowing man who stimulates both the mind and the spirit.

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amusements, mating, home, sanitation, training of young, love of the beautiful, morality, vice, crime, suicide, enemies and disease, odd partnerships, commensalism, age, strange incidents, relation to man. These are the "heads" that Seton lists in his introduction. They are not formally repeated in each life, but each life is rather the effective assembly of such information as is available on its subject. It is a great work, fascinating to read, satisfying for reference, and we are indeed fortunate to have it continue to be available.

Few could distinguish in appearance between the present reprinting and the work in its original eight-volume publication. This is not a lithographic reproduction but a new letter-press printing from the original plates. The printing is clear and the volumes remarkably light and easily handled.

It would have been helpful to have added on this republication an index to the entire work—all 104 lives—and if, as might be hoped, there are further printings such a general index might be added—together with a list of the 104 subjects. (The work still concludes with the note: "The author will be grateful for corrections or for details needed to complete this index.")

The plates have been rearranged, presumably for convenience in the book binding, although hardly for reading or reference convenience. More unfortunately, there have been a few omissions of illustrations. In three of the volumes Plate I is missing (although one might mistakenly assume that the frontispiece is Plate I) and in the other Plate VIII is lacking. In the second book of Volume IV another plate is lacking (Plate LV), although the text refers to it as on page 463 and the list of illustrations has it on page 468. This is in "Life LXXXV—The Beaver," one of the comparatively few that I have had the pleasure of rereading from this reprint edition in the short time it has been in my hands. The thought of the pleasure that is in store for those whom these new volumes will reach is indeed a pleasant one.

Lives of Game Animals: An Account of those Land Animals in America, north of the Mexican Border, which are considered "Game", either because they have held the Attention of Sportsmen, or received the Protection of Law, by Ernest Thompson Seton. With 50 Maps and 1500 Illustrations by the Author. 1953. Boston: Charles T. Branford Co. (8 volumes, 7 by 10 inches.) $50.

Volume I (in 2 volumes), Cats, Wolves, and Foxes. xxxix + 640 pp., with index.

Volume II (in 2 volumes), Bears, Coons, Badgers, Skunks, and Weasels. xvii + 746 pp., with index.

Volume III (in 2 volumes), Hoofed Animals. xix + 780 pp., with index.

Volume IV (in 2 volumes), Rodents, Etc. xxii + 949 pp., with index.

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Nature Notebook

Nature Notebook. By Robert Candy. Boston. 1953. Houghton Mifflin Company. 114 pages. Illustrated in color and black and white by the author. $3.00.

With this book the author-illustrator has achieved something truly different in the way of a Nature book, and one aimed at the young naturalist. There is a brief running story about a trip taken by Bill and his father. On the way they saw many things of interest. This running story takes a very few lines at the top of each page, the balance of the page being devoted to interesting and informative drawings with explanatory captions. If, for example, squirrels are encountered, the largest part of the page is a picture story of the life of the squirrel. Many of the drawings are aids to identification; others provide how-to-do information. Mr. Candy had a most interesting idea and has carried it out splendidly.

Bird Individuals

Birds as Individuals. By Len Howard. New York. 1953. Doubleday and Company. Foreword by Julian Huxley. Introduction by Roger Tory Peterson. Illustrated with photographs by Eric Hosking. 219 pages. $4.00.

When this book was first published in Great Britian it caused widespread interest because it revealed the author to be a person endowed with an amazing ability to achieve the confidence of birds. It also proved to be a book of definite ornithological importance and scientific value as well as general interest. This we have cribbed from Roger Peterson's introduction, in which he reports on a visit to Miss Howard at her Bird Cottage in Sussex. Roger says that he was really not prepared, although he had read the book, for what he saw and experienced on this visit. Space does not permit telling of what he saw, so all we can do is to agree heartily with Dr. Peterson's assertion: "It is a most unusual story she has to tell."

Insects Intimately

Insects Close Up. By Edward S. Ross. Berkeley, California. 1953. University of California Press. 80 pages. Illustrated in color and black and white. $1.50.

This beautifully and interestingly illustrated book is subtitled "A Pictorial Guide for the Photographer and Collector." Its author, now Curator of Entomology at the California Academy of Sciences, has long been peeking under stones and otherwise seeking out small crawling and hopping creatures. And he has been recording them on film. In this book he shows how fascinating insect photography can be, and how intriguing is acquaintance with insects. Data on collecting and preserving specimens are included.

Rocky Mountain Plants

Plants of Rocky Mountain National Park. By Ruth Ashton Nelson. Washington, D. C. 1953. U. S. Government Printing Office. 201 pages. Illustrated. Paper-bound, $1.00.

This is a second and revised edition of the original book, the supply of which was exhausted in 1945 and the demand for which has continued ever since. Rocky Mountain National Park is rich in its wild flowers and, therefore, visitors always seeks some means to their identification. This book provides such aid and includes identification keys. The numerous pictures are also of assistance, and there is an excellent index.

Other Worlds

Our Neighbour Worlds. By V. A. Firsoff. New York. 1953. Philosophical Library. 336 pages. Illustrated. $6.00.

Neighbor worlds, the possibility of life upon them and the prospect of visiting them is always fascinating to contemplate. In this book the author presents a popular but not exaggerated account of these other worlds and the status of interplanetary travel.

Physics

A Laboratory Manual of Experiments in Physics. By Leonard Rose Ingersoll, Miles Jay Martin and Theodore Alton Rouse. New York. 1953. McGraw-Hill Book Company. 286 pages. Illustrated. $4.00.

This is the sixth edition of this comprehensive laboratory manual. It has been thoroughly revised, with a number of outmoded experiments eliminated, others re-written and seven new ones added.

Physics: Principles and Applications. By Henry Margenau, William W. Watson and C. G. Montgomery. New York. 1953. Mc-Graw-Hill Book Co. 814 pages. $7.50.

This is a new edition of this excellent and popular engineering-physics text. It covers all the subjects normally covered in an introductory physics course.

"Art from Trees"

This is the title of a little booklet prepared by Alice Condon, art supervisor of the Algona, Iowa, Public Schools. It is a report on and description of art projects of various kinds that have drawn their inspiration from trees. The booklet is available for one dollar from North Iowa Directory Service, 522 East State Street, Algona, Iowa.

Jungle

Jungle Lore. By Jim Corbett. New York. 1953. Oxford University Press. 172 pages. Illustrated. $2.50.

Jim Corbett grew up in the jungle and this is really the story of his boyhood. Animal life has been a lifelong preoccupation of this author, also, and he has written extensively about it, nowhere more interestingly than in this latest book.

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☐ **CURIOUS CREATURES** by Erna Pinner. The author gives examples of curious behavior in the struggle for food, in nest-building, in paternal nursing; she shows us birds that cannot fly and four-footed animals that can; creatures which, either for protection or for aggression, make themselves appear what they are not; creatures living on other creatures for better or for worse; creatures ranking as giants in their own particular sphere, *illustrated.* $4.75

☐ **THE REBIRTH AND DESTINY OF ISRAEL** by David Ben Gurion. A victory dreamed of for centuries described by its chief architect, one of the greatest pioneers of the Jewish rebirth. $10.00

☐ **HISTORICAL ASPECTS OF ORGANIC EVOLUTION** by Philip G. Fothergill. The literature on evolution in all its branches is extensive, but this is the first book dealing with the "evolution of evolution"—that is, with the gradual development of the concept of biological change through the ages, and its application in various stages of man's understanding of the physical world. $6.00

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God and Nature

Here follows the bibliography to which we refer on the opposite page. Some of the references are to obscure works, no few of which are out of print and available only in the most fully shelved libraries. In some instances the publishers were not indicated by our correspondents. We have not, of course, been able to become personally acquainted with all of these books and, therefore, cannot vouch in every instance for the work's appropriateness. It is evident, however, that this list does constitute a unique bibliography well worthy of being presented here. The following sources were suggested by our readers:

Altars Under The Sky, by Dorothy Wells Peace, Abington-Cokesbury Press, Nashville 2, Tenn.

In Gods' Out-of-Doors, *The Prairie and the Sea*, *The Blessed Life* and *The Book of Clouds*, all by William A Quayle, published by Jennings and Graham, Cincinnati, Ohio.

The Man Who Talks with Flowers, by Glenn Clark, (20 cents), Macalester Park Publishing Co., 1571 Grand Ave., St. Paul 5, Minn.

St. Francis of Assisi and Love of Nature by Heber.

Everybody's St. Francis by Egan, Century.

Through Nature To God by John Fiske, Houghton Mifflin Co.

The Clearing by Jens Jensen.

Conservation Sermonettes by Justice H. Kline, National Wildlife Federation, Washington, D.C.

The Holy Earth by Liberty Hyde Bailey, Comstock Publishing Co., Ithaca, N. Y.

Symbolism of the Creation and Eternal Nature, by F. Bettex.

The Religion of Nature by E. Kay Robinson, McClure, Phillips and Co., New York.

The Meaning of Life by E. Kay Robinson, Thomasons, Ltd.

The Garment of God by John C. Merriam, Scribner.

Thomas Wingfold, Curate, and other works, by George McDonald.

Studies in Creationism by Frank L. Marsh, Review and Herald Publishing Co., Takoma Park, D.C.

The Spring of Joy by Mary Webb.

The Philosophy of Civilization by Albert Schweitzer.

Stewards in God's World by John and Ruth Ensign, Knox Press, Richmond, Virginia.

Two Roads to Truth by Edmond W. Sinnott, Viking Press.

He Made The Stars Also by Vera Moran, 75 cents from John Howell, 434 Post St., San Francisco 2, California.

Nature by Ralph Waldo Emerson.

God's Wonder World by Cora Stanwood Cobb, Beacon Press, Boston.

The Glory of God in Nature by H. Weseloh, Concordia Publishing House, 3558 S. Jefferson, St. Louis 18, Mo. (In German).

Ethics of the Dust by John Ruskin.

Peace in the Heart by Archibald Rutledge, Doubleday.

Come Unto Me by Charles Franklin Parker, Rinehart and Company.

My Way of Life (Chapter IV) by Thomas Aquinas, Confraternity of the Precious Blood, 5300 Ft. Hamilton Parkway, Brooklyn 19, N. Y. $1.35.

Truths Men Live By by John A. O'Brien.

Christ's Object Lessons and *The Ministry of Healing* by Ellen G. White, Review and Herald Publishing Company, Takoma Park, D.C.

Work-Days of God by Herbert W. Morris.

Holly

Hollies. By H. Harold Hume. New York. 1953. Macmillan. 242 pages. Illustrated in color and black and white. $6.75.

The author of this book is regarded as the foremost authority on hollies, plants that have enjoyed increasing popularity in American gardens. In this book the author treats with the various landscape uses of the hollies and all aspects of the culture and care of them. Much history, also, is woven into the interesting and informative text.

Mountain Goat

White Mountaineer. By Rutherford G. Montgomery. Boston. 1953. Little, Brown and Co. 177 pages. Illustrated by Gardell Dano Christensen. $2.75.

This is a true story of the Rocky Mountain goat told in fiction form. It is the story of the precarious life of this animal of the high country, and the wildlife with which he associates, or is associated. The author is an outdoors man who has spent a lifetime in observing wild animals. The knowledge he has thus gleaned is obvious in this entertaining and exciting story.

Tired Metals

Fatigue of Metals. By R. Cazaud. Translated by A. J. Fenner. New York. 1953. Philosophical Library. 334 pages. Illustrated. $12.50.

This specialized volume is for engineers and is a comprehensive survey of the characteristic and behavior of metals that are subject to stresses.

Cameroon Collecting

The Overloaded Ark. By Gerald M. Durrell. New York. 1953. The Viking Press. 272 pages. Illustrated by Sabine Baur. $3.75.

This is an extremely interesting and often exciting story of an animal collecting expedition by two young British zoologists, the author and John Yealland. It is a chronicle of a trip that consumed six months and took the collecting party into the great rain forests of the Cameroons of West Africa. This is a factual, often humorous, and entirely entertaining account, shorn of any glorification of the two main participants. Description of the animals collected is extremely interesting and there are several animal personalities encountered, among them a most personable chimpanzee, by name Chumley. An anthropomorphic touch here and there may easily be pardoned and credited to enthusiasm for the wild animals.

Briefly Noted

The Royal Gardeners. By W. E. Shewell-Cooper. New York. 1953. The British Book Centre. 66 pages. Profusely illustrated in color and black and white. $2.50. An interesting and attractive book about the garden interests of the late King George VI of England and Queen Elizabeth, the Queen Mother.

Still-Water Angling. By Richard Walker. New York. 1953. The British Book Centre. 232 pages. Illustrated. $4.00. A book by an angler with a scientific bent, setting forth new techniques that he has evolved.

Along the Great Rivers. By Gordon Cooper. New York. 1953. Philosophical Library. 159 pages. Illustrated. $4.75. Life along the Nile, Zambesi, Yangtze Kiang, Ganges, Murray, Volga, Danube, Mississippi, St. Lawrence and Amazon.

A Bear Is A Bear. By Inez Hogan. New York. 1953. E. P. Dutton. Illustrated by the author. $2.00. Story of bears for the younger reader.

The First Book of Plants. By Alice Dickinson. New York. 1953. Franklin Watts, Inc. 93 pages. Illustrated by Paul Wenck. $1.75. An introduction to plant life in this excellent "First Book" series.

The Watcher and the Red Deer. By Richard Perry. New York. 1953. The British Book Centre. 188 pages. $2.75. Delightful prose telling about life among the herds of deer in the glens and on the mountain pastures of the Scottish highlands.

American Constitutional Custom. By Burleigh Cushing Rodick. New York. 1953. Philosophical Library. 244 pages. $4.75. This thoughtful and pioneering book is concerned with a forgotten factor in the founding of our Republic.

A History of Astronomy. By J. L. E. Dreyer. New York. 1953. Dover Publications. 438 pages. Cloth, $3.95. Paper $1.95. Retitled second edition of this work on astronomy's history from Thales to Kepler.

The Modern Greenhouse. By J. S. Dakers. New York. 1953. The British Book Centre. 258 pages. Illustrated. $2.50. A new and practical guide to the management of the warm and cool greenhouse.

Relativity and Reality. By E. G. Barter. New York. 1953. Philosophical Library. 131 pages. $4.75. A study of modern views on Relativity and an attempt to clear up certain "paradoxes."

Contents Noted

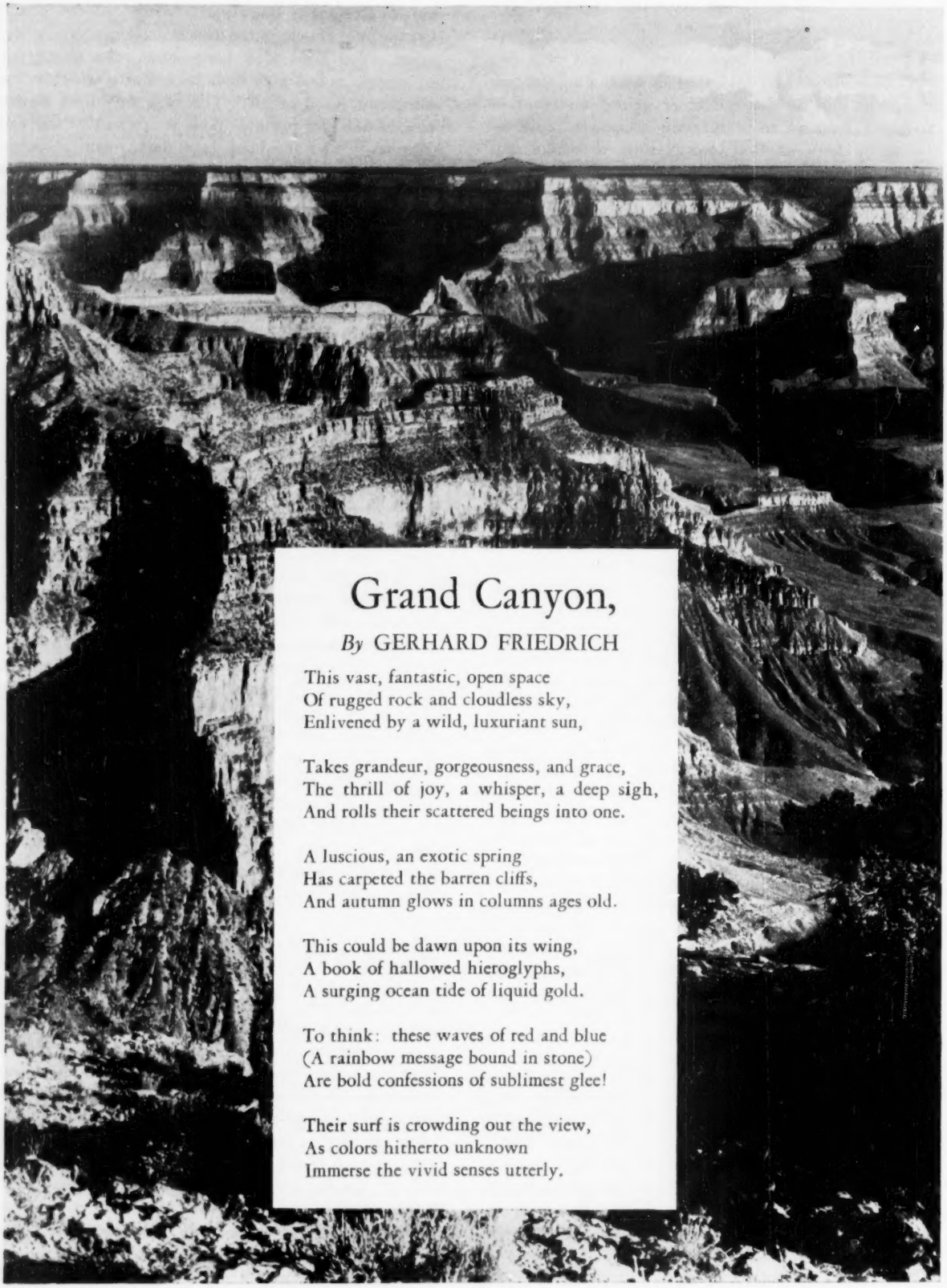
HERE, in May, we reported the request of a correspondent who said that he was an "amateur naturalist and free lance outdoor writer" and that he sought references to works emphasizing a close relationship between God and Nature, or works that relate Nature and the conservation of natural resources to Christianity. Being able to supply only a most rudimentary bibliography, we appealed to our readers for assistance. The response was most generous and interesting, and we were privileged to read many thoughtful letters. Our correspondent was generally advised to read *The Bible* and the writings of Sweitzer, Thoreau, Muir, Burroughs, Teale, Peattie, Swedenborg and Emerson. Also, many specific titles were recommended, and from these suggestions we have compiled a bibliography, which appears on the page facing this one. May we take this opportunity to thank the many readers who wrote us so fully, interestingly and helpfully. Folks with an interest in Nature are truly rather special people.

COMMENTING briefly here, in the August-September issue, on a "pest control drive" conducted by a Future Farmers of America group in Ohio, we expressed regret that such activities were "too often laid out for FFA and 4-H Club groups." Whereat we were taken to task, for including the 4-Hers, by O. L. Kaupanger of the Minnesota Emergency Conservation Committee, which is headed by Charles L. Horn, President of Federal Cartridge Corporation. For many years Mr. Horn has been notably active in fighting those who are against the hawks and owls. And Mr. Horn has worked closely with the 4-H Clubs on a national basis. The result is that this fine young peoples' organization has been on the side of these birds. Our inclusion of the 4-Hers in the note was due to an occasional case where local leadership had not been educated to present-day appreciation of the place of such predators in the Nature picture. A survey of 4-H activities during the past year revealed practically no emphasis on predator control, and it is reassuring to know that 4-H Club members can be counted upon as friends of hawks and owls.

GENERAL Electric's researchers at Nela Park, Cleveland, have been checking up on the lightning bug. Using complicated laboratory apparatus, including a photometer and an oscilloscope, they found that it would take one to two thousand of the bugs to illuminate a room as much as the light of one candle would do. A lumen is a standard measure of light and the average lightning bug was only equal to producing six-thousandths of a lumen. Compared with a 60-watt, inside-frosted light bulb,—General Electric, of course, —which produces 835 lumens of light, it would take 137,000 lightning bugs, all lighting up at the same time, to give out as much light. General Electric found that the light closest to the insects' in lumen production is one called $NE\text{-}_2$ glow lamp, often seen on electric appliances, radios and such to indicate whether the instrument is on or off. This is a tiny light source recommended for portable table lamps so that one can more easily find the lamp in a dark room. General Electric admitted that the lightning bug is the most efficient light producer, converting 98 percent of the energy it employs into light, but, they urge, their little "firefly lamps" burn longer, being good for more than 25,000 hours. Furthermore, the company points out, the little glow lamp burns when portable lamp or wall switch are turned off, but the lightning bug turns on its light at dusk and then only when in a romantic mood.

HOLDING its annual meeting in Missoula, Montana, the Outdoor Writers Association of America adopted several strong conservation resolutions. The scribes went on record against two proposed dams—Sun Butte on the North Fork of the Sun River in the Bob Marshall Wilderness Area, and Glacier View on the North Fork of the Flathead River, both in Montana. The Association went on record in support of the Hope Bill, H.R.5348, to correct abuses possible under present antiquated mining laws, and in support of the Baker Bill, H.R.1972, to provide adequate funds for administration of the recreational use of national forests. Other resolutions urged adequate funds to implement the Water Pollution Control Law and adoption of a water policy along the lines of a policy drafted by a committee of the writers' organization. The O.W.A.A. also established a standing committee to collect and disseminate information on the use of herbicides and insecticides, with the objective of averting undesirable effects of such use on both wildlife and useful plants. The Association also reiterated its stand for the multiple use principle in the administration of public lands.

NOVEMBER 8 to 14 constitute a span of days of vital importance to all Americans. This is American Education Week. A wide variety of devices are proposed to focus attention upon our schools. In a way it is unfortunate that it should be necessary thus to drum up enthusiasm for our schools and the American system of education. The theme for this year's observance is "Good Schools Are Your Responsibility," a statement that should be obvious to everyone. Yet apparently it is not obvious, and too many of us take the schools for granted as something for which the "school people" and not the individual citizens are responsible. So let us see to it that American Education Week in 1953 is a rededication to an active interest in our schools. R.W.W.



Grand Canyon,

By GERHARD FRIEDRICH

This vast, fantastic, open space
Of rugged rock and cloudless sky,
Enlivened by a wild, luxuriant sun,

Takes grandeur, gorgeousness, and grace,
The thrill of joy, a whisper, a deep sigh,
And rolls their scattered beings into one.

A luscious, an exotic spring
Has carpeted the barren cliffs,
And autumn glows in columns ages old.

This could be dawn upon its wing,
A book of hallowed hieroglyphs,
A surging ocean tide of liquid gold.

To think: these waves of red and blue
(A rainbow message bound in stone)
Are bold confessions of sublimest glee!

Their surf is crowding out the view,
As colors hitherto unknown
Immerse the vivid senses utterly.

PHOTOGRAPH BY HAROLD ORNE

The stone walls of the New England countryside were made from the rocks cleared from the fields to make farmlands, pastures, or to mark boundaries. These fences offer shelter to wildlife.

Do Fence Me In

By ANNETTE H. RICHARDS

ALTHOUGH cowboys may lament, "Don't fence me in," and traditionally loathe the post-roundup winter drudgery of fence-post digging and fence mending, Robert Frost says that "Good fences make good neighbors." And ever since man settled down to agriculture he has built walls and fences, for one reason or another.

Even the cowboy must admit that where the range is fenced it places an outside limit on the territory over which his charges can roam. Thus he does not have to watch over them night and day; when he wants them, he has only so far to hunt. The first reason for a fence seems to be to keep animals in or out. And the common requirements for such fences in farming districts are that they be "horse high, bull strong, and pig tight." Certainly the farmer does not want his prize, blue-ribbon heifer roaming the countryside at will, or, on the other hand, his neighbor's pigs stampeding through his wheat crop.

Surveyors are constantly on the go determining land boundaries, and in some areas landowners are legally required to mark these boundaries with fences. This leads us to walls built for defense. One of the most impressive walls ever built is the fabulous 1400-mile-long Great Wall of China, constructed by the Emperor Ch'in Shih Huang Ti, when he came to power in 228 B.C., in order to keep the nomadic Tartar tribes out of his country. In the interim between World War I and World War II, the French and Germans built the Maginot and Siegfried Lines as mutual invasion-insurance. And today we have the modern counterpart of these earlier barriers, the Iron Curtain, an ideological as well as a physical fence.

Sometimes a wall results from the clearing of land.

U.S. SOIL CONSERVATION SERVICE PHOTOGRAPH

This living fence of multiflora rose keeps the horse or cow safely in the field, and also gives food and shelter to wildlife and produces ornamental, bee-attracting flowers.

Where can one put the big stumps, the brush, the small trees, the stones? Where, indeed, but out of the way along the edge of the desired field? Huge old stumps make effective livestock barriers, and who can forget the sight of these grotesque shapes and the rugged line they form? In Ontario, Canada, you can still see many pastures and fields bordered by this increasingly rare fence. And where did the characteristic New England stone wall get its origin but from the painstaking and endless task of removing the stones from the fields so crops could be grown? Scratchy, prickly brush is not a pleasant barrier for sheep and goats to push through, and, especially in climates with long dry seasons, these fences last a long time. Hand in glove with this desire to clear land is the desire to make use of otherwise waste products—heavy stone, bulky stumps, assorted brush, and the like.

And what about privacy? Has not man always craved this essential to his soul? Man wants human companionship—true, he was not made to live alone—but also he does not want to live in a perpetual goldfish bowl. The so-called "service area" of our back yards is not the most ornamental view to be framed by a picture window. So we try to screen it off in one way or another—with hedges, flower borders, latticework, fences of some sort. And if we entertain in our garden, we like to be somewhat shielded from the glances of passers-by on the street.

This fence in a Mexican village is made up of a stone wall, organ pipe cactus and yucca.

PHOTOGRAPH BY THE AUTHOR

In some countries, this desire for privacy is carried to the extent of building walls around homes so that all that is ever seen from the street is a high, uniformly uninteresting and unrevealing barrier. The only inkling the stranger outside has of the home on the inside of the wall is a chance glimpse through an open doorway of a beautiful patio that is host to flowers, trees and birds.

Since time immemorial, man has used fences as weapons against extremes of Nature. He builds dikes and levees to keep out the sea, or an overly rambunctious river. He builds fire lines through forests to prevent forest fires from rampaging uncontrolled. He builds fences to restrain the drifting snow from covering roads and blocking traffic. He plants rows of trees in the "dustbowl" areas to protect his crops from the wind and to regulate the

temperature behind these living barriers. Man protects his citrus and avocado orchards from damaging winds in southern California with the dramatic Australian eucalyptus tree planted in majestic rows along the edges of his precious fruit orchard. He develops and constantly repairs the walls that support the terraces on which crops can grow, even on precipitous hillsides, because by levelling off steep slopes, he prevents rainwater from carrying the precious topsoil down into the valleys. Man builds dams to wall up rivers so that they can be controlled in their various unpredictable moods, and at the same time provide water for irrigation and power for electricity. Man battles the elements of fire, air, water, wind, snow, rain, and earth—all by means of ingenious kinds of walls and fences.

That fences, hedges, and walls can provide beauty for those who pass goes without saying. And the infinite variety of ways in which man consciously uses them for this noble purpose is a source of never-ending pleasure.

PHOTOGRAPH BY THE AUTHOR

The Ontario farmer who cleared these pine stumps from his land also wanted a fence of a type now rare.

And now we come to yet another inbuilt, innate function of fences—their great usefulness in providing food and cover for all manner of birds, insects, and small mammals. This, of course, applies to the many species of living, growing fences. The famous hedgerows of England not only enhance the attractive, manicured appearance of the green countryside, but they also offer immediate protection for a scurrying rabbit or a frightened bird. The osage orange hedge gives welcome shelter in its prickly embrace to all manner of wildlife. Our newest all-in-one favorite for wildlife borders is the multiflora rose, a living barbed-wire fence that needs no repair work, that grows an ornamental crop of flowers as well as an edible crop of berries, and that serves as an enviable haven or refuge for animals. What more could you ask of a fence than that it be a livestock enclosure, have beauty, need no upkeep, and provide food and cover for wildlife?

In many places in the world, where low standards of living prevail, firewood is of paramount importance

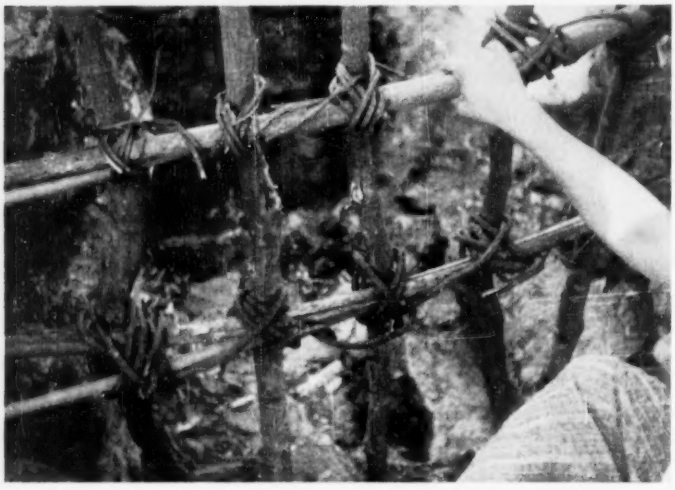
This young windbreak on a Kansas farm already protects from damaging winds. Such fences are planted on flat, wind-swept areas all over the world.

U.S. SOIL CONSERVATION SERVICE PHOTOGRAPH

for fuel. Necessity being the mother of invention, people have perfected another economically valuable use for fences—to produce firewood. The osage orange could easily be trimmed and cut and its product be profitably used for this purpose if our standard of living were so low as to require it. In Mexico and other Central American countries, the pollarded fence is no rarity. It consists of a row of trees that are strung together by barbed wire and cut back to the trunk to promote the growth of a dense head of foliage. By wise pruning methods, the farmer stimulates the growth of the few small shoots he permits to grow and thus is able to harvest a good crop of firewood every two or three years. Some of these pollarded fences produce lovely pink or red blossoms in the spring and, incidentally, dress up the entire countryside.

PHOTOGRAPH BY THE AUTHOR

We can still admire the graceful zigzag of the split rail fence of the pioneer.



PHOTOGRAPH BY THE AUTHOR

Ingenuity and hard work went into the making of this Mexican fence, but no nails. Poles and vines from the nearby forest were the only materials used.

From the early days of the TVA in the Tennessee Valley comes a story of a farmer who finally "solved" the perpetual fence headache that plagues ranchers and farmers the world over. He took his team of horses and ploughed a deep furrow right straight down the steep hillside. Proudly he boasted of his feat to friends and neighbors. With each rain the man-made gully grew deeper and deeper until at last no animal could cross it. No more fence building or repair for him! This was simple!

But the "fence" grew wider and deeper with each rain and he could not stop it. It was encroaching on his fields, it was a menace to his livestock, it was carrying away his precious topsoil. It got to the point where the poor man would not even go to town any more for fear of the jeers and laughter he would en-

Even balloons have been used as a glorified fence in the air. When England was trying to protect London from enemy aircraft during World War II, it surrounded the city by a ring of balloons. In England, by the way, a ditch is legally considered a fence. Certainly in modern zoos, where the trend is towards doing away with visible fences between visitors and animals, deep ditches or moats have done just as good a job as the old-fashioned fences, and give a more realistic effect of wild animals in their natural habitats, too.

Here the fence protected the area on the right side from grazing cattle for one year, with the resultant luxuriant growth.

U.S. FOREST SERVICE PHOTOGRAPH

counter! He had a fence, all right!

The first mental picture that pops into your mind at the mention of "fence" is usually some neat construction of board, concrete, plank or wire. But the materials out of which fences are made are limited only by the locale in which they are built. In the early pioneer days of America, when the trees had to be cut down to make place for fields, the rail fence was a common rural sight. And one of our greatest Presidents gave fame to this picturesque fence by the fact that he split rails for them in his youth. A common name for this wooden fence was "snake," or "grasshopper," because of its zigzag form. And who but the pioneer, pressed by the necessity both to clear his land and to mark his boundaries would ever think of using stumps for such a purpose?

PHOTOGRAPH FROM NATIONAL FILM BOARD OF CANADA

Perhaps the most uninteresting and ordinary fence is the barbed wire one, which needs constant repair and may harm wildlife.

There is seemingly no limit to the variety of cactus fences you can find in Mexico—and all are effective barriers that need little or no upkeep. The picturesque maguey, which yields pulque, tequila and a valuable fiber, when planted in even rows offers a strong argument against the wanderings of greener-pasture-minded cattle. If you have ever battled futilely to remove the almost invisible spines of a prickly pear cactus from your finger, you will respect a fence of this plant. Another cactus that forms a neat, space-conserving barrier is the organ pipe cactus, a one-column, green, straight-growing plant that far exceeds man in height. These are sometimes trained to grow in a regular line by being held in by crosspieces of bamboo or sticks.

One frequently sees intricately woven fences of sticks or bamboo throughout Mexico. These shield a yard from the eyes of the public and keep domestic animals safely where they ought to be.

In sun-drenched places like the Southwest, Mexico, the Middle East and the Orient, what would be a more obvious and native material for a wall than mud or adobe bricks? You can make them in your own back yard from its own mud mixed with straw. Your kiln is the baking sun. And once thoroughly dried, they form a hard and durable building material. The Great Wall of China is constructed mainly of earth and stone coated by a layer of bricks. It is intimately connected with the landscape, in fact it seems almost to be like Nature's own creation, an intrinsic part of its surroundings. And what other material would have been as easily accessible in that rugged, mountainous country? This wall preceded by centuries Frank Lloyd Wright, who contends that building materials should be chosen in accordance with the natural environment.

Yes, when you come to think of it, people who never even heard of the word "conservation," the wise utilization of natural resources, have through the ages not only used locally available materials, however seemingly unfencelike in character, in the building of their walls and fences, but they have learned to make these same barriers perform many other functions for them. By means of fences, men achieve privacy, protect their animals, grow firewood, control climate by deflecting wind, regulate rivers to their own needs—not to temperamental seasonal happenstance—, grow homes and food for all manner of wildlife, make excellent use of otherwise waste products, and even hang their laundry on them!

Our cultural heritage includes the Parable of the Good Shepherd bringing the sheep safely into the protection of the fold; Tom Sawyer's immortal whitewashing of the fence (speaking of upkeep!); the traditional white cottage with the white picket fence; Abe Lincoln's rail-splitting symbol of manhood, simplicity and the hope of all Americans that any man can be President; the familiar back fence gossip; the military walls of China; medieval battlements; Maginot and Siegfried Lines and the Iron Curtain; and Robert Frost's probing poem about "Mending Wall," in which he searchingly poses the question as to the purposes and functions of walls. Yes, mankind seems wedded to fences, and in their materials and uses they are like Cleopatra, of whom Shakespeare said, "Age cannot wither her, nor custom stale her infinite variety."

Even in such a prosaic part of human life as fences, we find man exercising his eternal ingenuity, originality and individuality. And man has turned the negative of the cowboy's lament into the phrase "*Do* Fence Me In."

Our Swallows Make It Summer

By MYRTLE J. BROLEY

One of the tree swallows inspects a nesting box specially made for it and before the box had been put in place.

IF THERE is a bigger thrill than that of having a wild bird flit lightly over to sit on your hand, I do not know it!

We live right over the water at one end of an island in the Rideau Lakes in Ontario, Canada. This is an ideal spot for insect-eating tree swallows, which spend most of the daylight hours catching and eating flies, gnats, dragonflies, and other insects. These little birds prefer to nest in cavities in the trees. But we had few of these, so we put up bird boxes. Some of these were rather elaborate ones, to begin with, painted dark green so they would not be too conspicuous. Later they were made from odd bits of lumber, such as old nail boxes. In the fall the boxes are taken down, cleaned and repainted to be ready when the birds arrive.

Most springs the tree swallows get here just about the same time we do—the last week of April. Last spring we had to come up quite early and thought we would have a long wait for our little friends. But on March thirtieth we discovered about six of them flitting about, singing, scolding and looking over the boxes. The lake was still a vast expanse of ice, and the air was cold. A few more swallows arrived, but most did not appear until after the ice broke up, around the middle of April. Soon all the boxes were occupied; indeed, Charlie slapped a couple together in a few minutes to satisfy a couple of pairs trying to oust some that had arrived earlier. While he was putting these up the would-be tenants hovered about his head; alighted near him. Before my husband could get down from the stepladder one swallow ventured into the box, came out and sang to his mate. After we had stepped back she tried it also.

These birds measure six inches from tip of shiny black bill to end of slightly forked, dark tail, and are a glistening or metallic steel blue. In certain lights this blue looks distinctly green. The breast is purely, immaculately white. The graceful wings are black, showing some bluish or greenish luster, and the tail is the same. Females are often duller in color than the males, and, occasionally, a brownish female will be seen, an immature bird that has not attained her proper plumage.

To me tree swallows are the personification of freedom, daintiness and purity. Their happy little song is charming and their remarkable flights are a joy as they turn and bank, twist and glide.

These swallows are among the first birds to sing in the early morning hours, the repeated call sounding like "tsip, prrup; tsip-prrup pruup," varied by a number of bubbling notes after each "tsip." They have been known to sing steadily for an hour, with the phrase repeated from 125 to 140 times a minute.

There is one light-green box near the house that started out as a covering for the electric pump switch. When this was moved inside, the box was turned into a swallow home, the catch left so one could look in.

The pair that occupied this were very tame; little stars in the popular movie reel Charlie took. In the spring we held their box back until we were sure most of the colony had returned. After a pair had settled in the box they did not seem as tame, and, since we do not band the swallows because it seems to upset them, we could not be sure they were the same friendly pair. Until the full set of eggs is laid the swallows do not spend much time around the boxes, so it is often hard to tell whether they are timid or merely anxious to feed.

One lovely Sunday morning near the end of April, we were surprised to find that a number of fights were taking place. When these birds fight they really go all out. I have picked a pair up off the ground to separate them, or run, clapping my hands hard, to frighten them away from each other. Most of the quarrels are over nesting sites, so we put up another

box. This time, however, we had forty or more boxes around, so decided the battles must have a different but undetermined cause.

The previous year one of our birds had hurt his foot and lost out in the struggle for a nesting site. We hung up two extra boxes but they were taken over by other pairs. The cripple did not seem able to fight them off. He would sit on the verandah railing, chirping plaintively. Finally I asked Charlie to put up a box on a verandah post.

Limpy seemed to know it was for him, and went in at once to try it for size. He came out carolling, or, perhaps, he was telling the other swallows that this was his property. Most of them kept away from the verandah, anyway, except on cold mornings when they would congregate there to get warm. Soon Limpy flew off, and, although we had not noticed an unattached female around, he soon returned with a mate. She settled on the railing while he went in and out of the house he had chosen for her. At last she was persuaded to enter. On this first visit she only remained a moment, but she went in again, and apparently that decided the matter. Their brood, later than those in other boxes, were often fed when twenty or more people sat quite near, watching the parents go in and out.

Sometimes the swallow would perch on one's hand held near the entrance to the nest and with a beak full of food.

This year the box was put up in the same place and the pair paid little attention to our comings and goings. In the afternoon of this fine Sunday we were sitting at the other end of this verandah when a pair of tree swallows settled quite near us. The male warbled his little song and seemed quite fearless.

"He's very tame," I said, "I don't think I've noticed him around before. Have they a box?"

"Oh, I think all of them have boxes now," my husband said," I think they are just enjoying the sunshine here."

"Have you got another box? Would you fix me one? I'd like to see if that's what they want."

My husband went out to the shed, quickly nailed together a little box and brought it to me. I was holding it, considering where it should go when the male swallow lit on my hand and began looking over the structure. He teetered back and forth, hopped to the entrance, looked in, talked to his mate for a few minutes, sat on my hand again and finally went into the box, which I was trying to hold steadily. When he came out and rejoined his mate on the railing I handed the box to Charlie, who had already driven a nail into the nearest post. He hung it in place. It was unpainted, the printing on it showing that it was part of a box that had contained nails. But it was home to this little pair and they at once took it over. The little male flew to my husband's shoulder, after he had returned to his chair, and settled there long enough to sing his song several times. He seemed to know we wanted him to perch on our hands for, when we would go over and put a hand near his perch on the box, he would come and settle contentedly on a finger. His mate was more timid, but she soon learned to take feathers from us.

Other springs the swallows had perched on our fingers when we held our hands near the holes through which they were feeding young, but this was our first experience with one acting so tame before nesting had begun. We were sure he was our last season's hero and were happy that he was able to return to us.

Tree swallows make a nest of fine stems, roots and pine needles, mixed with feathers, which are often beautifully arranged with the tips curling up and over the eggs. Four to six pure white eggs are laid.

We early discovered that a white feather is to a nesting tree swallow what a candlewick bedspread is to a woman. A commotion in the yard one day started because one bird had brought in a lovely, plumy white feather and that all the others were trying to get it away from her. We ripped open a pillow, picked out the white bits and tossed them into the air. In the ensuing scramble we saw that some birds would venture very near to snatch treasures from the ground. Then I tried holding a feather loosely in my fingers. I do not know which of us was the more surprised when a daring swallow swooped and carried it off and up to her nest.

We now have a number that will fly to us and take the feathers from our hands. A few will reach their heads from their boxes to take a proferred feather. Of course, the intrepid bird that takes the plume from

us does not always manage to get it to her nest. It may be grabbed by another, then another, before it is finally hustled in through a door. Even a small feather is a weight for these elfin creatures, and a light breeze adds more difficulties.

Our little tame bird will accept insects from our fingers, although it does not always eat them. Quite often it flies out over the lake and drops them in.

We were amazed at the way these birds skim along, just over the water, dipping in it from time to time for a sip, an insect, or, maybe, a wash. One day, when the lake was very calm, my husband threw a bunch of white feathers on the surface and the swallows swiftly snatched up every one. It was a lovely sight to watch; graceful and precise.

Some of the swallows that liked solitude would nest between the rough stones of the Broleys' guest house.

The brownish-gray babies, with their shining black eyes and pure white breasts, are, to us, cuter than most infant birds. We love to watch them poke their wee heads out to watch for father or mother coming with food. The egg hatches in from thirteen to sixteen days, and the young remain in the box from sixteen to twenty-four days, depending on the amount of food they receive. Where the parents have many to feed, the young develop more slowly. Once they leave they do not return to the nest. Even on their first flight they display a surprising mastery of the air.

Last spring friends were coming to visit us who would, we knew, want to take pictures of some young swallows, and of the parents feeding them. Unfortunately our most cooperative pair had fewer young ones so that they grew rapidly and were due to leave the nest earlier than we had planned. The day before our friends' arrival the last fledgling flew. He started off while the female was at the box, but the male must have been away with some of the earlier graduates. Charlie got another box, the same size, shape and the color, and in which there were four small babies, and hung it in the place where the other had been. The father returned with food. He flew to the hole, took one look at the family and almost fell backward! We could imagine his consternation. What could have happened to make the young ones lose weight and shrink like that? Gamely he went to work, and for two hours he steadily lugged food to these usurpers. Then his mate must have told him that someone was fooling him for he did not appear again.

Afraid that these interlopers might suffer, we returned the box to its proper spot, and the real parents set about feeding them immediately.

One Saturday afternoon we heard a great confusion among our birds and rushed out to see what was happening. A sharp-shinned hawk was flying down along the pathway among the boxes. The whole flock of swallows flew out over the lake with the hawk in pursuit. They rose high and although he gained altitude swiftly they kept above him. The last glimpse we got they were far, far off, still well above the menace.

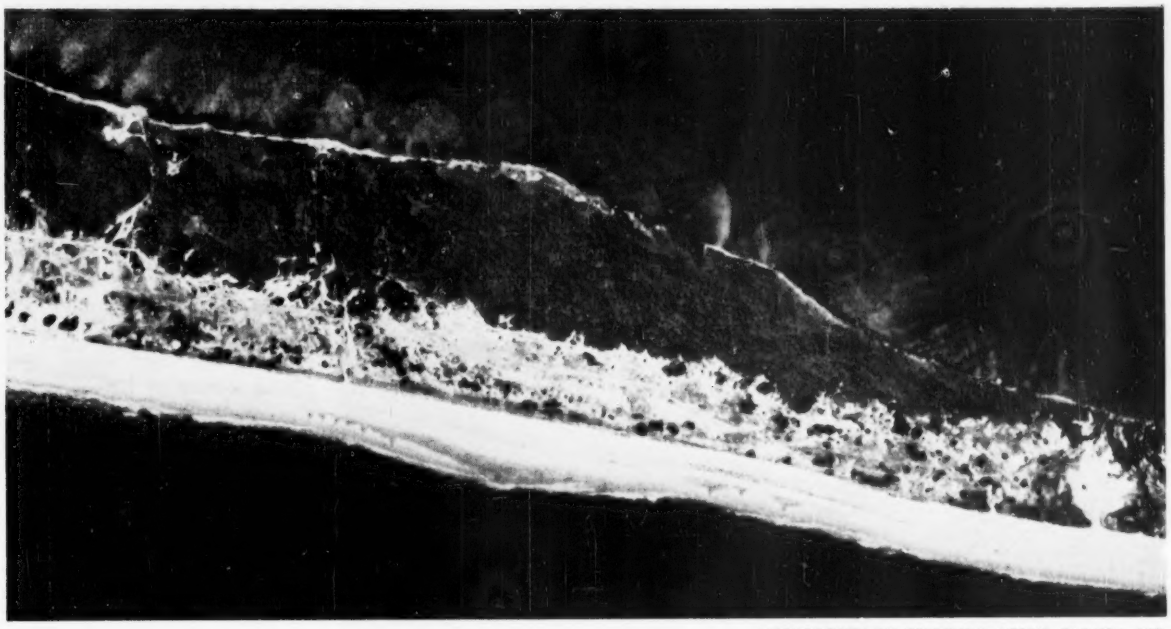
At that period the birds were building but no eggs had been laid. This was, perhaps, just as well since, for four hours not a tree swallow was to be seen around the place. The silence was unnatural and worrisome. We kept running out to look for them and were delighted when two came in, circled high several times, then settled in the trees. One by one they returned, until at last we were sure all were back. Next day we noticed one little chap with practically no tail.

Tree swallows will eat some weed seeds, or berries, but beetles, ants and flies make up the bulk of their food. Grasshoppers, spiders and dragonflies are also consumed and we have seen them eating hornets. It is noteworthy that we are not pestered by mosquitoes or black flies here, although they are a plague nearby.

One of the most endearing things Sunday, our little male swallow, has done to date was one cold afternoon when we had not been out on the verandah to talk to him at all. Late in the day Charlie went out and sat down nearer Limpy's site. At once Sunday flew in and settled right in front of him, carolling away as if asking for a bit of attention.

The tree swallow is a lover of ponds, lakes and streams, possibly for gastronomic reasons mostly, as he finds plenty of food in the abundant life around them. This might be the reason the fable that they hibernate by plunging beneath the waves, burying themselves in the mud of the bottom to await the return of spring was so hard to refute. Even today there are people who believe this. Around this district we see these birds gathering in great flocks, filling lines of wires as they get ready for their southern migration.

Charlie wanted to take some movies of these large flocks. We have seen six or seven thousand swallows feeding in Florida. Last January he saw one splendid gathering and got just the picture he had hoped for. One of the birds flew to him, tried to look in the telephoto lens and seemed quite unafraid. He could not help wondering if this could have been one of the birds from our island, one of our beloved summer visitors.



PHOTOGRAPH BY FAIRCHILD AERIAL SURVEY, INC.

The Sunken Forest of Fire Island from the air. In the foreground is the ocean, then the white line of beach, merging into the barrier dunes, then the forest, and, finally, the bay. At the extreme left may be seen houses in the little settlement of Point o' Woods, one of a few widely scattered settlements, which, with a lighthouse and a Coast Guard station, are the only inroads of humans.

Sunken Forest of the Dunes

By HOPE SATTERTHWAITE JEX

MUSICAL whistle of spotted sandpiper, double note of piping plover, staccato cry of common tern, the least bittern's raucous croak, varied with his gentle cooing, and everywhere, up and down the line of the pounding surf, the sanderling, snatching choice morsels from under the very crests of the in-sweeping combers and retreating to safety as they break—these are wild, feathered inhabitants of twenty-five miles of trackless barrier beach, which shields the coastline with a natural breakwater and forms on the shoreward side a quiet lagoon.

Turn your back on the ocean. Climb two parallel dunes, stretching the length of the barrier. From the crest of the inner dune, some thirty-five feet above sea level, your gaze will meet the roof of a secret forest in the hollow beyond—a tangled, luxuriant stand that has never known the bite of woodsman's ax.

Where is this outpost of Nature? It is within a figurative stone's throw of Manhattan's towers. Great South Beach, as it is known on the charts, or, in local parlance, Fire Island Beach, is one of the chain of barrier beaches sheltering the western portion of Long Island's south shore.

Many of Manhattan's residents would be among the most astonished to learn of this seashore wilderness so close at hand. One by one, the nearby beaches have been taken over by amusement park or real estate interests. Coney Island, the Rockaways, Long Beach, Jones Beach, all offer pleasure facilities of various man-made types, flanked by old-style cottages or modern "ranch houses," each with its pocket handkerchief of land. Yet, so far, Fire Island Beach has escaped these so-called marks of progress. Except for a few small, widely scattered settlements, a Coast Guard station and a lighthouse, the strip of land remains as it was in Indian days. No causeway, but an old-fashioned ferry, connects it with Long Island proper. To step off this ferry, fresh from the carnival of "improved" beach and modern parkway, is to step into a forgotten world of slow enchantment.

Here the stretch of unspoiled beach and dune calls to such shy shore birds as the piping plover. And, although it breeds in the Arctic and winters as far south as Patagonia, the unmolested tide line so attracts the sanderling that he seems omnipresent, being found in varying numbers for more than half the year. Beyond the ocean-fronting dunes, marsh and land birds find a paradise of seaside swale, one that increases in enticement of berry and beach plum, of thicket and wind-stunted tree, until, over the crest of the inner dunes, it offers its surprising woodland haven, merging gradually into marshland patches and the

Looking over the Sunken Forest from the top of the high, protecting dune, one can see how the action of the wind has levelled off the tops of trees. Note the sharp drop of the sandy path as it enters the Forest.

sand flats bordering the bay side of the barrier.

Heartening as it is to find a niche of untouched seaside tucked like a gem amidst the tinsel glitter and dull utility of Long Island coast "improvements," Fire Island Beach holds the special attention of natural scientists through the phenomenon of its forest growth. Known as the Sunken Forest, this bit of lush, rank wilderness stirs the imagination as to its beginnings. Shielded by the windbreak of the dunes and rooted in quartz sand beneath a half-foot of black humus, ancient trunks of American holly and tupelo; sassafras and wild black cherry; red, black and post oak; pitch pine; red cedar and red maple lift a thick canopy, roofing a cool, green gloom, guarded by tangled cat brier and roped with twisting grape and poison ivy, which part occasionally to permit a softer flooring of wild sarsaparilla, Canada mayflower and shadowy ferns. All this is in a narrow beach hollow, flanked by dune and sand flat and interspersed with marshes.

Residents of Point o' Woods, the village just to the west of the forest patches, are particularly proud of the hollies, as well they may be. In spots these hollies form dense stands, permitting competition from no other trees. Exclusive groves of tupelo and sassafras likewise may be seen. But the hollies bear the distinction of being the last of their kind of appreciable size on Long Island, as well as the northernmost in eastern North America, with the exception of a single grove on Cape Cod. The trees range from vigorous saplings to gnarled and twisted old-timers, some with cloven trunks, some with grotesquely jutting knobs and branches. These old-timers number their years in century marks. Many of them show ten to twelve-inch diameters at breast-height and reach skywards thirty-five feet. And the vigor of the young growth prophesies continued centuries for the forest unless molested from without.

The flatland forming the floor of the forest averages only a few feet above the placid waters of Great South Bay, the lagoon lying between the breakwater of the barrier beach and Long Island's south shore. From dune crest to forest floor the land pitches steeply. Once within the twilight tangle of the trees, it is difficult to remember that, just to the south, Atlantic combers pound a sun-drenched beach. Little light seeps through the wind-sheared, leafy roof. The yellowish-gray of the gnarled and ancient holly boles bestows an eerie effect. Smaller, but even more wind-twisted are the trunks of the tupelos. Bark of black and red oak appears inky in the deep shadow. Many of the sassafras trees have trunks fifteen inches in diameter and pitch pines with seventeen-inch trunks may be found.

Between the woodland patches shrubs and bushes cluster thickly, edging much of the scattered marshland, although in some spots pine or oak grows to the very verge, and a few scattered hollies have forced their way northward to the strand of the bay. Shadbush dominates much of this growth, which also includes bayberry, huckleberry, beach plum, cat brier and other such plants, with occasional clumps of groundsel bushes and stunted oaks.

The marshes provide refuge for such typical plants as cattails, swamp rose, azalea, pink rose mallow, sedges and St. Johnswort. Although most of these marshes reach to the bay, a few are forest-encircled. And everywhere, through woodland and swale and marshland, are the birds—green heron and ruby-throated hummingbird, kingfisher and crow, bobwhite and cedar waxwing, various warblers, Baltimore oriole, Carolina wren, cowbird, towhee, chickadee, song sparrow, to mention just a few, and not to forget the ubiquitous catbird, who seems to outnumber all the rest.

That so varied a strip of wilderness should have escaped "development," especially in a section where a premium is put on space, smacks of the miraculous, a happy miracle for Nature enthusiast and conservation-

This holly, called "The Chair," is more than three feet across the "shoulders." Many ancient hollies are found in the forest, together with an association of trees and shrubs of wide variety.

ist. But recently the threat of real estate interests has loomed disturbingly near. Were it not for a few forward-thinking spirits, the Sunken Forest might even now have been leveled by bulldozer, the marshland filled in, the twisting trunks of holly and tupelo a memory buried beneath rows of identical bungalows.

When, a year or so ago, the threat became imminent to the heart of the forest, containing the oldest and densest stands of holly, Dr. Ernest Osborne of Teachers College, Columbia University, and two associates bid in the endangered land at an auction sale. Since then, the Nature Conservancy has joined in the campaign to save the woodland, Oakleigh Thorne II of that organization playing an especially active part. To date, the dense stands are in three ownerships. Contributions have enabled the Conservancy to acquire one of these. And Dr. Osborne has given it an option until January 1, 1954, on his section at the price he paid. The Conservancy also holds an option on the third section, but this option will soon expire and thus presents a critical problem. Once permanent ownership is established, the safety of this bit of wilderness in its entirety will be assured, since the properties run straight across the barrier beach from ocean to bay. Until the form of permanent ownership most likely to guarantee continued protection for the area is decided upon, Wildlife Preserves, a non-profit corporation now engaged in conserving various natural sites near New York, has agreed to take title to the land as it is acquired. Already this organization has posted the forest at several strategic spots with signs, reading:

SUNKEN FOREST SANCTUARY

Enjoy Yourself—
But Do Not Cut, Pick
or Dig the Plants,
Shrubs or Trees.

NO HUNTING

Thus are the first steps being taken to save for posterity the treasures of Fire Island Beach. A man, it has been said, can cut down within an hour a tree that has taken fifty years to reach its present height. Some of the Fire Island hollies are hundreds of years old. And the barrier beach has been thousands of years in the making. Built through the long past by slow, inexorable action of wind and wave, the beach, the dunes, the swale, the marshes, the forest combine to offer tranquil escape from the mechanized world that so closely approaches this wild seashore haven.

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Animal Adjectives

By GUS PAPPAS

HERE is a quiz that will make you stop and think in more ways than one. The scrambled "ine" adjectives in the right column each relate to some animal listed in the left column. Can you match them correctly? *SCORE FOR CORRECT ANSWERS*: 1—4, fair; 5—8, good; 9—12, excellent; 13—15, extraordinary. See page 498 for answer.

1	dog	.....	(a)	ursine
2	cat	.....	(b)	vulpine
3	horse	.....	(c)	bovine
4	cow	.....	(d)	hircine
5	lion	.....	(e)	ovine
6	hare	.....	(f)	piscine
7	fish	.....	(g)	equine
8	pig	.....	(h)	leporine
9	mouse	.....	(i)	murine
10	sheep	.....	(j)	porcine
11	wolf	.....	(k)	canine
12	fox	.....	(l)	hirundine
13	bear	.....	(m)	feline
14	swallow	.....	(n)	lupine
15	goat	.....	(o)	leonine

Thomas Mayo Brewer

By W. L. McATEE

BREWER was one who did not think too highly of the younger generation. That attitude has its exemplars in every installment of humanity that drifts across the sea of time, but in him it was particularly marked. And to him, anyone who had not been acquainted with Audubon, or at least with Nuttall, was an upstart, who should be seen but not heard. Having in his first publication, in 1837, added 45 species, or 25 percent, to the list of Massachusetts birds, he regarded that field as his private preserve and did not welcome poachers. For a long time he ruled undisturbed, but then came the crowd of young scientists who eventually founded the Nuttall Ornithological Club. They were interested in additions and subtractions affecting the State catalog of birds, and boldly had their say. Articles multiplied and were sometimes sharp in tone. It was said that only one of the youngsters, William Brewster, could get along with Brewer. Then came the "Sparrow War," in which Brewer was the leading figure in approval, as was Elliott Coues in condemnation, of the English sparrow and its introduction and aided spread in North America. Battle was really waged and sometimes the exchanges were almost as pointed in reference to the participants as to their subject, which its detractors called by such hard names as "dirty pirate" and "avian rat."

THOMAS MAYO BREWER, 1814-1880

So it came about that Brewer was regarded with prejudiced eyes, and his place in American ornithology has perhaps not yet been justly appraised. But first let us consider his heredity, birth, training, and experience. His fighting spirit may be regarded as natural for he was a grandson of James Brewer, one of the leaders of the Boston Tea Party. His life span was from 1814 to 1880 and he was a Bostonian through most of those years. He was graduated from Harvard in 1835, and took an M.D. degree at the Massachusetts Medical School in 1838. He acted as dispensary physician for the "North End" of Boston, but continued in that and other medical practice for only two years, when he got an editorial position on the *Boston Atlas*, a leading Whig newspaper. His journalistic work led in time to a term of duty as Washington correspondent.

There was always an undercurrent of ornithology, however; of field trips and note-taking, and publication of the results. He joined the Boston Society of Natural History in 1835, and for more than forty years was a contributor to its Proceedings. In 1840 he brought out an edition of Wilson's *American Ornithology*, in a duodecimo volume of 750 pages and more than 300 figures. This contained his own Synopsis, covering all the known birds of North America, and additional notes on life-histories, besides critical remarks and synonymy from the Jardine print of 1832.

Brewer visited Spencer F. Baird in Pennsylvania in 1844 and doubtless saw much of this young friend after the latter's appointment to the Smithsonian Institution in 1850. The Bay State ornithologist's particular interests were in the eggs and life-histories of birds, and he published along those lines in the Smithsonian Contributions to Knowledge, a quarto volume on *North American Oology* in 1857. This was illustrated by figures of the eggs of 49 species on 5 plates, which in one edition were beautifully colored. His intention was to complete a work on this subject, but the cost of plates was so great that no further volumes were published by the Smithsonian Institution.

Brewer left newspaper work in 1857 to join a Boston publishing firm, of which he became president in 1875. Again, that is a mere summary of his vocation for eighteen years; his avocation, as always, was ornithology. It was in this period that he prepared the material which formed nearly two-thirds of the text of *A History of North American Land Birds*, issued in three volumes in 1874. This work was in collaboration with Spencer F. Baird and Robert Ridgway, who provided the technical matter. Brewer supplied all of the accounts of life-histories, and also left manuscript of the same nature. This formed the body of the two additional volumes on water birds, which appeared in 1884, four years after his death. The entire five volumes, of large pagination, were adequately illustrated, although not in Brewer's favorite department, the eggs. Nor did the manuscript prepared for continuation of the *North American Oology* ever appear in any book of his authorship.

After nearly a score of years in the publishing business, as a vacation, Brewer spent most of the years 1875 and 1876 in Europe, touring the principal countries, getting acquainted with leading ornithologists, especially oologists, and (Continued on page 498)

Hilo Threatened

By OTTO G. JANSSEN

HILO, Hawaii's second largest city, is marked by Nature for obliteration unless man takes steps to prevent it. This is not the prediction of an imaginative Sunday newspaper supplement writer. It is the word of Dr. Gordon A. MacDonald, volcanologist in charge of the Hawaiian Volcano Observatory.

Hilo lies in a valley between the two great volcanic mountains, Mauna Loa and Mauna Kea. The city is at the end of this valley, where it meets the ocean.

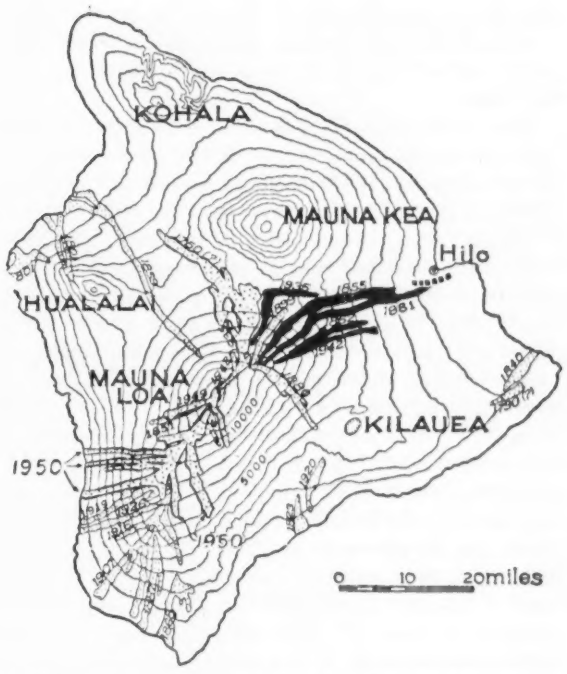
During the past 100 years, lava from Mauna Loa has on five occasions rolled down the valley toward Hilo and the sea. During two recent eruptions, in 1935 and 1942, man had to resort to the use of aerial bombs to divert the flow. In 1881, the molten rock reached a point where Hilo now stands.

Ever since volcano observation in Hawaii has been placed on a scientific basis, experts have been warning of the danger to Hilo, now a city of 25,000 and the Territory's most important port after Honolulu.

Last fall, Dr. MacDonald issued this warning in a signed article in the *Honolulu Star-Bulletin:*

"The city and harbor of Hilo, with their enormous importance to the economy of the Island of Hawaii, are so situated that their eventual destruction by lava flows appears an absolute certainty, unless something is done about it."

What can man do against the force that destroyed Pompeii in A.D. 79, wiped out 20,000 people at St. Pierre, Martinique, half a century ago, and, more recently, killed 4000 people in New Guinea and 500 in the Philippines?



The black fingers show lava flows of the past and the dotted line the location of the proposed barrier to protect Hilo.

Dr. MacDonald and other experts believe something can be done—in Hawaii, at least. Fortunately, Hawaiian volcanoes are not of the explosive kind. They give plenty of advance warning, and when the eruption comes they pour out their lava rather than blowing it out with explosive force. A Hawaiian volcanic eruption is a signal for people to start running toward it, rather than away.

Because of the lack of danger, a road has been built through the fern forests to the rim of Kilauea crater, one of Mauna Loa's great vents. Visitors may sit on the crater's edge and watch the fireworks display in the cauldron. When an eruption is under way, world-famous Volcano House, a hotel built on the rim of the crater, is filled to capacity. Airlines flying over this area are booked solidly and special

Hilo city and harbor as seen from the air.

flights are added to handle the rush to see the event.

Nonetheless, an eruption is a force to be reckoned with, particularly if the lava starts rolling in your direction.

One of the most favored plans put forward to provide permanent protection for Hilo is the erection of a protective wall. It would be arc-shaped and would be designed to divert rather than dam the lava.

Dr. T. A. Jagger, one of Dr. MacDonald's predecessors, once estimated that a wall averaging about 20 feet in height and five miles long would cost about $1,000,000. It would probably be built of loose earth, stone and concrete. In 1940, the U. S. Army Engineers made a study of the project and concluded the city could be protected by such a barrier. They estimated it would cost about $2,500,000. However, nothing was done about it. A new Federal survey proposed by Delegate Joseph R. Farrington of Hawaii has been approved by the House Public Works Committee, but funds are not presently available.

Dr. Jagger, in urging erection of the barrier, declared that if disaster struck Hilo the loss "could not be reckoned in money." He pointed out that, as great as the loss would be to man-made works, it could not approach the loss of the harbor, the last sheltered bay that can be used by large vessels on the sugar-plantation side of the island. Approximately 35 percent of the sugar produced in the Territory is grown on Hawaii. Loss of Hilo harbor would be a hard blow to the sugar growers.

However, Dr. Jagger believes that the menace of lava is as removable as the menace of disease, if there is a will to do so. Aerial bombing, which was tried with success on two occasions, is one method. However, experts say that bombing cannot always be relied upon, especially when the flow is particularly fast and hot. The surer protection, they feel, is the lava barrier.

Not all eruptions present a danger to Hilo. During the 1949 and 1950 outbreaks the lava flow was in the opposite direction, away from Hilo. Neither did the 1952 outbreak offer a threat to the city. However, there is no way of telling in advance which way the lava is going to roll, or of doing much about it unless protective measures have been taken.

On July 7, 1953, Madam Pele, as the volcano is called in Hawaii, showed signs of restlessness. A momentary jerk was felt in Hilo and the surrounding area. At that time, there was no particular concern, but Dr. MacDonald said the movement gave indication of some further uneasiness on the part of the volcano.

Blackwater Falls

One thousand acres surrounding Blackwater Falls, one of West Virginia's more popular scenic attractions, has been presented to the State for use as a State park. The gift is made by the West Virginia Power and Transmission Company, a subsidiary of the West Penn Power Company, of Pittsburgh, and was arranged by A. C. Spurr, president of Monongahela Power Company. For some time the State has operated the area as a park on a cost-free lease, but the gift of title to the park is expected to speed its development. The recent legislature appropriated $30,000 for improvements on the site.

Blackwater Falls is high in the mountains, and the Blackwater River drops sixty-five feet at the park site. Throughout the warm months there is always a torrent of water plunging over the falls. In the winter it offers a spectacular scene, mists from the falls freezing and coating surrounding rocks.

Although there are overlooks of easy access to the tourist, the ruggedness of the terrain and the deep gorge into which the stream falls have served to preserve the natural beauty of the area and the wildlife inhabiting it. The stream itself offers excellent fishing and a variety of small animal life abounds. The steep sides of the canyon are covered with fine stands of timber and numerous wild flowers and plants common to high elevations. The site is also a haven for bird life. Rhododendron, mountain laurel and azaleas present an array of color from early spring until mid-summer.

The river got its name from the rushing water, which looks black where it eddies and amber where it breaks. The coloring is caused by decaying organic matter along the headwaters. Despite the coloring, however, the water is pure and extremely soft.

The stream lies high in the mountains. The park is at an altitude of 3000 feet and the headwaters drop from an altitude of more than 3500 feet. The town of Davis, near the falls, is the highest incorporated town in the Mountain State.

Drama on the Wooded Island

By ALICE CARVER CRAMER

Illustrated by Barry M. Martin

MAY thirteenth looked exactly as the hundred preceding days had led us to expect—nasty. The sky was dark and sooty; the pavements and yards and buildings were wet and dismal and sooty; the light, smoggy rain was sooty. And the everlasting wind howled in the weatherstripping.

"It's never going to do anything else," said my husband. "We may as well get out for a few minutes."

I called the boys. "We're going to the Wooded Island for half an hour. No back talk, please. We all need a breath of air."

I took up the bird glasses.

Scarcely able to distinguish a bald eagle from a wood pewee, we had lately become amateur bird watchers. After all, if on your walks through city parks you are peering through the undergrowth for a thug eager to throttle you, you may as well peer for a redstart at the same time, especially if you live in one of the continent's great migration lanes.

Dr. Finch had found a whippoorwill.

A little past the bridge that takes one on the island, we paused beside the charred foundations of the former Japanese pavilions. A small, yellowish bird fluttered in the bushes beside the path, and disappeared. "What was that?" we cried ecstatically, fumbling much too late for the glasses. The boys gave us despondent glances, and dashed away from us. All was still, except for the drip of rain and the voices of robins and cardinals. We stood for a little, ogling and craning our necks, but the bird was gone and we had no inkling of its identity.

We overtook the boys at the edge of the open lawn, bordered by trees and bushes, that makes up the main part of the island. Under a shrub an oven bird minced along. We stopped again to look. As we did so, a couple strode up along the way we had come. Both wore field glasses at the ready on their chests.

"*Have* you seen the prothonotary?" cried the lady in tone of joyous challenge.

In leafing through Peterson's *Field Guide*, I had noticed a warbler called the prothonotary, but I had never seen one. Nor had I ever called the name or heard it called, and, in the sublimity of my ignorance, had supposed it to be accented on the third syllable. The lady, of course, accented it on the second. And her clarion question, booming through the May rain and mist in which I stood fatuously gazing at an oven bird, took me by surprise. As my husband had not glanced at that particular page in Peterson, he was even more at sea than I.

"There was an oven bird here just now," he offered mildly.

The lady tossed him a brief stare. Even *I* knew that she was not the kind of individual to whom one mentions oven birds.

Stung, I gathered my wits. "Maybe we did," I cried "Back by the—"

"Back by the Japanese buildings!" finished the lady, in a happy roar. We were beginning to sound like the griffon and the mock turtle explaining the lobster-quadrille, as we shouted, waved our glasses, and bawled nonsense to each other through the rain. "That's where it was seen, all right. You saw it just now? Good, *fine*!"

Snatching up her glasses to be ready, she charged off.

The gentleman did not accompany her. He beamed proudly upon her retreating person, then turned to us. "First prothonotary to be seen here in seven years," he said in a solemn whisper. "Mrs. Ramsay knows more about warblers than anyone in Chicago." After a dramatic pause to allow this great fact to illuminate us, he tossed his head. "*I'm* off to see whether both olive-backed *and* gray-checked thrushes are here now." And he vanished around a bush.

We were alone in the rain once more. The boys' mouths were hanging open. For once, we read in their eyes, they were really in on something—a bunch of grown-ups acting the fool with genuine abandon. Instead of racing on ahead, they came meekly to heel as we resumed our pilgrimage.

A dozen steps, and we froze. Right before us, in the lowest branches of a budded horse chestnut, there flitted with exquisite deliberation a magnolia warbler, black and yellow with white accents. It came nearer,

within thirty inches of us; then, butterfly-like, fluttered to our feet, rose, fluttered at our hands and faces. We knew that birds are sometimes fantastically unwary on a rainy May day, but in our brief experience we had never seen anything like this.

Into this idyll Mrs. Ramsay sped once more.

"It's a prothonotary all right!" she shouted. "Just where you said." She hastened by, paused, looked back and cried: "Dr. Finch has a whippoorwill out towards the lake. Maybe your boys would like to see it."

"Dr. *Finch*?" I called after her incredulously.

"Dr. Finch," she called back. "You know."

She disappeared around a bush, whirling away on some avian quest of importance.

"She's exactly like the Red Queen," complained my husband. "She makes me giddy."

"We may as well see this whipporwill," I declared, firmly enough to quell any objections, and plunged into the thick bushes away from the open lawn. My men trailed after me. Wet leaves brushed our necks and showers of fat drops fell on us from the branches we disturbed. But in a few moments we came upon a lone, calm man in the thicket. He was one of those rather magnificent professional men, middle-aged, beautifully dressed, bland. He stood in the rain with hands folded, quietly waiting for something.

"Dr. Finch?" we said. (His name really was Finch, or practically that.) He nodded. "Someone said you have a whipporwill here—"He nodded again and motioned for quiet.

"I want Mr. Endicott to see it," he said very softly. "If the boys won't frighten it, I could show you now."

The five of us tiptoed over soggy leaves as he led us a few feet from the narrow path, parted the bushes, and pointed with satisfaction to—nothing; just nothing at all. Of course we knew all about the whipporwill's protective coloration, and were prepared to look hard. But look as hard as we would, we still saw absolutely nothing whatsoever.

"Where, Mother? Where is it? Where—"

"Sh-sh! Right where Dr. Finch is pointing. Do be quiet," I answered helplessly.

Another figure slipped up to us from nowhere.

"Finch?"

"Endicott? Fine. Right over here—"

Mr. Endicott peered as we had done. "*Where*, Mother? I don't see it," the boys chanted in a fretful murmur. "Sh-sh," I answered.

"Now," said Dr. Finch calmly, "we've all seen it, I'll flush it."

He took a step, another, a third, toward the patch of brown leaves four feet before us, at which we had all been staring.

Suddenly there were long, bent wings, folding and unfolding in a noiseless zig-zag, low over the bare woods floor. The whippoorwill—just to be in the style of the day—vanished around a bush.

The boys blinked. Dr. Finch beamed, like a magician who has just made a rabbit disappear into a hat.

"It didn't so much fly," said my husband, "it dissolved."

A small yellow bird hovered like a humming bird.

"The softest flight in the world." This was a faint, ecstatic sigh close behind us. We turned, surprised, to see who this unknown seventh member of our group might be. A little damp woman in an old reversible was with us. She smiled in a kind of beatitude, nodded, and—you're right—vanished around a bush.

"Who was *she*, Mother?" whispered one of the boys, as we thanked Dr. Finch and turned into the path again.

"She was the dryad of Jackson Park," my husband stated firmly. "I'm wet. Come on, let's go back and have a cup of that Chinese tea."

His voice broke the spell for the boys. Shouting, they abandoned their awed docility and raced away from us toward the bridge. We followed briskly, our collars turned up against a fresh downpour that served to urge us on.

At the Japanese buildings we were hardly looking about us. But a sudden flash of gold caught our eyes. There, just where we had seen it before, a small yellow warbler hovered like a hummingbird. "There's your pro*thono*tary," said my husband. "The first in seven—the first in thirty-seven years."

Out of the rain, out of wet wraps and shoes, we thought our dark apartment seemed cozy. As we sniffed the steam from our tea, one of the boys suddenly left his mechanical train. "I'm a whippoorwill," he declared, and began to dance.

It was a brief dance, lasting possibly a minute, and there was no audible music. But for that minute, in his arms there were low wings and zig-zag flight, soft and secret, while we stood again in wet May air laced with the notes of cardinals and rose-breasted grosbeaks, brushing elbows with the mad, happy fraternity of those who watch the birds.

Winter Buds and Twigs

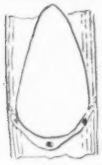
Of Some Common, Alternately Budded, Woody Plants

By E. LAURENCE PALMER

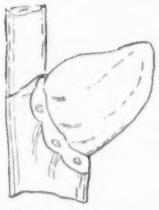
This is the seventy-third in NATURE MAGAZINE'S *series of educational inserts.*

LEAF SCARS

Broad

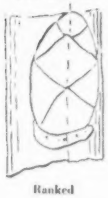


Narrow



Encircling Bud

BUD SCALES

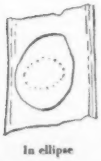


Ranked

Spirally Arranged

BUNDLE SCARS

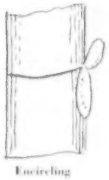
U-shaped Line



In ellipse

STIPULE SCARS

Lacking



Encircling Stem

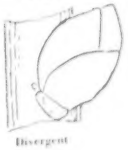
Present

TERMINAL BUD

Lacking

Present

BUDS



Divergent

Appressed

The sixty-fifth number of this series dealt with the winter buds of a series of opposite-budded woody plants. So much interest was expressed in that subject that it seemed a responsibility to provide this insert, which presents some alternately budded woody plants.

It is important that we have some understanding of these plants for a number of reasons, one of which is the fact that when we buy a woody plant in a store, or from a catalog, the chances are excellent that it will come to us in its winter condition. We should be able to know something of what we are buying.

On this page we present a few illustrations of the characters used in identifying woody plants in their winter condition. In general they are relatively simple, in spite of the fact that in some plants the characters may be obscure.

The features to learn to identify are essentially these. The *leaf-scar* is the scar left by the leaf when it fell from the plant at the end of the summer. It is usually marked in the illustrations by one or more dots arranged variously. These are the *bundle scars* and represent the broken ends of the canals that supplied the leaf with nourishment or took nourishment from the leaf. Then there are the *stipule scars*. These represent structures usually found to begin at the angle of the leaf scar and extending wholly or part way around the stem. In many plants these are absent, and their absence is a distinguishing character that should be recognized.

The *buds* tell us much about our woody plants. We do not here attempt to distinguish between flower buds and leaf buds, although we show these differences in the sketch of the pussy willow. It may seem strange but it is sometimes difficult to determine whether a bud is present or absent. This refers primarily to what is called the *terminal bud*. A bud at the end of a twig is not necessarily a terminal bud, in spite of what many of our pre-college texts tell us. Where a terminal bud is absent the end bud has beside it a scar left by a leaf that was shed, and, in addition, a scar that represented the point where the twig stopped elongating. Two scars beside an end bud usually mean that the terminal bud is absent. We have used as a major basis of classification in this article the presence and absence of stipule scars and of terminal buds. An examination of the sketches of the plants in which these characters vary should give the explanation necessary.

In some cases where we are making species determination it is important that we notice the bud scales closely. In the elms, for example, there are easily recognized species differences based on this character. Then, too, it is important in a few cases that we note whether the scales are spirally arranged, or in ranks. If they are in ranks, a line drawn through the tips of the scales from the top to the bottom of the bud would parallel the main axis of the bud. In a spiral arrangement this would not be so.

★

Aspen Leaves

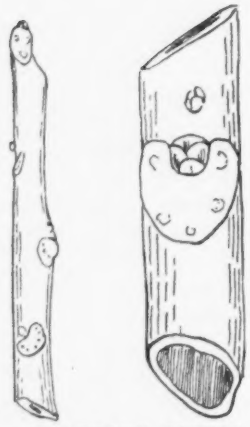
By RACHEL GRAHAM

Take joy of them before November shakes the last
Of all their tiny tambourines with its rough blast.

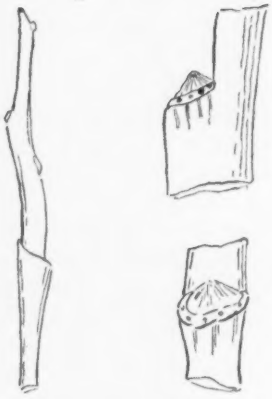
Alternately Budded Twigs

With Stipule Scars Lacking

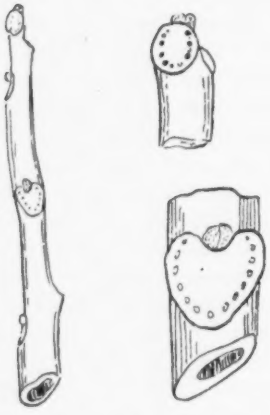
With Terminal Buds Lacking



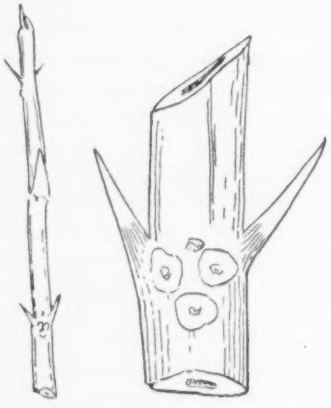
KENTUCKY COFFEE TREE



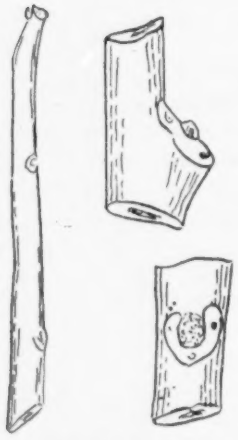
LEATHERWOOD



TREE OF HEAVEN



BLACK LOCUST



WAFER TREE

HONEY LOCUST

KENTUCKY COFFEE TREE

Gymnocladus dioica

Buds: More or less sunken, one partly surrounded by leaf scar; another slightly above the first.
Scales: Bud scales blunt, short, few exposed, in silky hollows.
Leaf-scars: Large, broad, somewhat heart-shaped, slightly elevated.
Bundle-scars: 3 to 5, irregular.
Twigs: Coarse, somewhat scaly, sometimes 3-sided, with large salmon-colored pith.

TREE OF HEAVEN

Ailanthus altissima

Buds: Small, sunken, hemispherical, partly surrounded by leaf-scar.
Bud-scales: 2 to 4, exposed.
Leaf-scars: Large, broad, conspicuous, slightly raised around edges.
Bundle-scars: Numerous, in a heart-shaped line or broken ellipse.
Bud Scar: At the end there is a scar apparently caused by a terminal bud, which is lacking in winter.
Twigs: Coarse, finely fuzzy at times.

HOP OR WAFER TREE

Ptelea trifoliata

Buds: Low cones, mostly surrounded by leaf-scar, obscurely double; may break through leaf scar.
Bud-scales: Like silvery silk, not distinct scales.
Leaf-scars: Large, horseshoe-shaped, slightly raised.
Bundle-scars: 3, conspicuous, separated, somewhat sunken.
Twigs: Moderately coarse, round in cross-section, warty, dotted.

LEATHERWOOD

Dirca palustris

Buds: Short, stubby cones almost, if not wholly, surrounded by leaf scar.
Bud-scales: About 4 show obscurely.
Leaf-scars: Growing swollen part of twigs, relatively narrow with scallops on outer margin.
Bundle-scars: 5, sometimes indistinct.
Twigs: Slender, rubbery, smooth, enlarged at end of season's growth.

BLACK LOCUST

Robinia pseudoacacia

Buds: Hidden by membrane at first but finally breaking through leaf scar area, or above it; small.
Bud-scales: Not distinct but few.
Leaf-scars: Obscurely defined triangles or deeply heart-shaped.
Bundle-scars: 3, distinct, in leaf-scar lobes.
Twigs: Somewhat angled, brown-pithed, definitely coarse, prickled, the prickles being persistent and stipular.

HONEY LOCUST

Gleditsia triacanthos

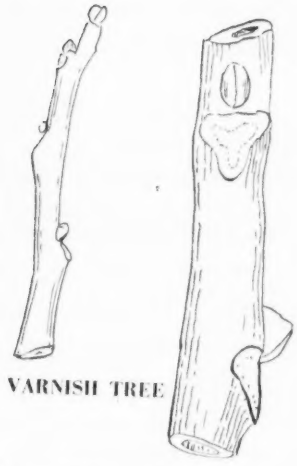
Buds: In pairs, one above the other, with one sometimes developing into branch-coarse spine, smooth.
Bud-scales: Few, blunt, close, with ragged edges.
Leaf-scars: Highly irregular, shield-shaped, pierced by buds, slightly raised.
Bundle-scars: 3, separated, conspicuous.
Twigs: Zig-zag, dark brown, tough.

Alternately Budded Twigs

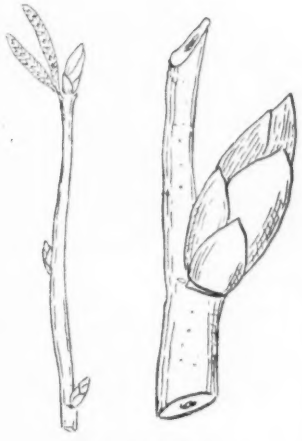
With Stipule Scars Lacking (Varnish Tree)

With Stipule Scars Present (Others shown)

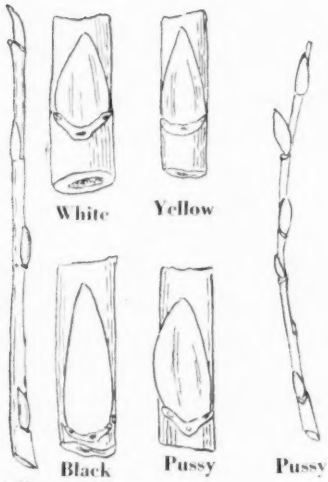
With Terminal Buds Lacking



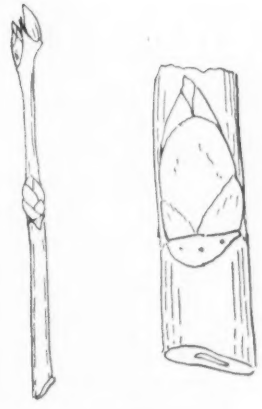
VARNISH TREE



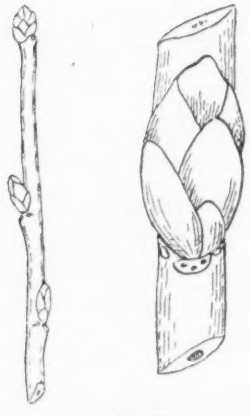
HOP HORNBEAN



WILLOW



BUCKTHORN



HORNBEAN

SYCAMORE

VARNISH TREE

Koelreuteria paniculata

Buds: Blunt, divergent, stubby point-cones or hemispheres. No terminal.
Bud-scales: 2 exposed, relatively smooth and plain.
Leaf-scars: Large, 3-lobed, somewhat elevated, shield-shaped or roughly heart-shaped.
Bundle-scars: Many in a line, roughly following outline of leaf-scar, or making 3 groups of scars.
Twigs: Coarse, angular, large-pithed.

WILLOW

Salix sp.

Buds: Slender, mostly pointed, with tips close to stem. Rarely opposite.
Bud-scales: One, enclosing the bud.
Stipule-scars: Small, short or sometimes absent.
Leaf-scars: Narrow crescents bounding lower margin of the buds.
Bundle-scars: 3, distinct, separated.
Twigs: Usually slender, with species varying in color: yellow W., yellow; black W. and Pussy W., dark to black.

BLUE BEECH, HORNBEAM

Carpinus caroliniana

Buds: Rarely superimposed, 2-ranked, egg-shaped.
Bud-scales: 4-ranked, smooth, showing many scales, not spirally arranged.
Stipule-scars: Small, slender, inconspicuous lines extending leaf-scars.
Leaf-scars: Narrow, inconspicuous and easily overlooked.
Bundle-scars: 3, separated, usually not seen without handlens help.
Twigs: Slender, zig-zag, dark, tough.

HOP HORNBEAM

Ostrya virginiana

Buds: Small, slightly divergent, pointed, somewhat egg-shaped.
Bud-scales: Spirally arranged rather than in ranks as in *Carpinus*.
Stipule-scars: Unequal, long, inconspicuous.
Leaf-scars: Somewhat raised crescents, small and inconspicuous.
Bundle-scars: 3, separated, inconspicuous.
Twigs: Slender, dark, tough.

BUCKTHORN

Rhamnus cathartica

Buds: Solitary, with tips somewhat appressed and tips pointed.
Bud-scales: more or less 2-ranked, that is, every other one in line.
Stipule scars: Small to minute.
Leaf-scars: Alternate but sometimes opposite or both on same plant, raised, half ellipses.
Bundle-scars: 3, more or less distinct.
Twigs: Stiff, erect, dark, swollen at leaf-scars.

SYCAMORE

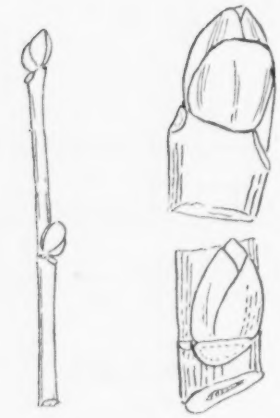
Platanus occidentalis

Buds: Conspicuous fluted cones with tips somewhat divergent, yellowish.
Bud-scales: 1 completely enclosing the bud, glossy.
Stipule-scar: A line encircling twig.
Leaf-scars: Conspicuous, encircling the bud entirely; widest away from twig, supported by fluted swellings.
Bundle-scars: Large, 5 to 9, some compound, may be sunken or grouped.
Twigs: Coarse, zig-zag, smooth, swollen at leaf-scars, tough.

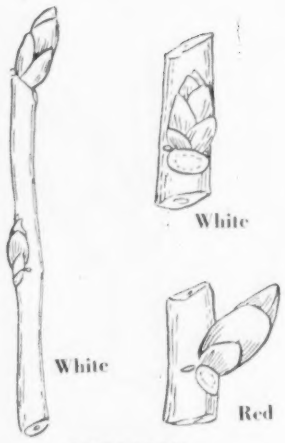
Alternately Budded Twigs

With Stipule Scars Present

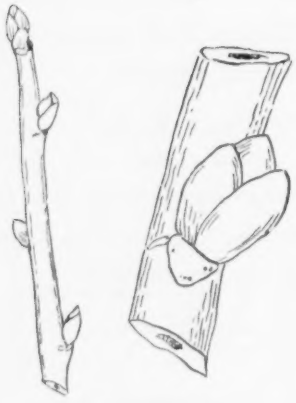
With Terminal Buds Lacking



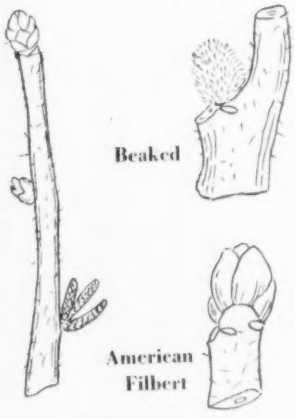
BASSWOOD



MULBERRY

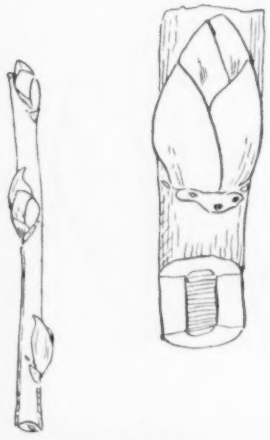


CHESTNUT



HAZEL

ELM



HACKBERRY

BASSWOOD
Tilia americana

Buds: Plump, bluntly pointed, somewhat divergent, smooth.
Bud-scales: About 3 show, with the lower longer than ½ length of bud.
Stipule-scars: Small, oval to linear, continuing line of leaf-scars.
Leaf-scars: Broadly but unevenly oval, slightly swollen.
Bundle-scars: In irregular closed ellipse, many; slightly sunken.
Twigs: Rather coarse, vari-colored, zig-zagged frequently.

CHESTNUT
Castanea dentata

Buds: Plump like small basswood buds; definitely divergent, shining.
Bud-scales: Only a few, usually 3 or less showing.
Stipule scars: Small, oval, relatively inconspicuous but distinct.
Leaf-scars: Somewhat swollen, broadly oval to triangular, raised.
Bundle-scars: Usually in three groups, each compounded of smaller units.
Twigs: Stiff, brown, relatively slender.

ELM
Ulmus sp.

Buds: Plump. Somewhat divergent.
Bud-scales: Of American, brown; of slippery, dark brown to black with rusty-haired margins.
Stipule scars: Small, distinct, at edges of leaf-scars.
Leaf-scars: Somewhat swollen and corky, broad, usually light brown.
Bundle-scars: 3 or apparently 3, usually sunken in corky leaf-scar.
Twigs: Of slippery, gray; of cork, corky; of American, brown.

MULBERRY
Morus sp.

Buds: Of white, with appressed tips; of red, with divergent tips.
Bud-scales: Few, usually 2-ranked, with the lower the shorter.
Stipule-scars: Small, slender, at angles of the leaf-scars.
Leaf-scars: Broadly and irregularly oval, slightly raised.
Bundle-scars: Many in a closed transverse ellipse.
Twig: In white, bud-scales are uniformly colored; in red, they are brown-edged.

HAZEL
Corylus sp.

Buds: Blunt, oval, stalkless, divergent.
Bud-scales: Of beaked, outer scales are shed early but persist in filbert. As result, beaked bud looks fuzzy.
Stipule-scars: Long slender lines at leaf angles.
Leaf-scars: Broadly oval to triangular, slightly elevated, conspicuous.
Bundle-scars: 3 or apparently in 3 groups of many scars.
Twigs: Slender, with somewhat 3-sided pith.

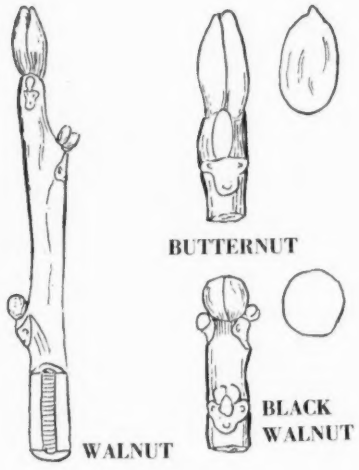
HACKBERRY
Celtis occidentalis

Buds: With conspicuously appressed tips and whole bud close to the stem.
Bud-scales: About 4 show, in 2 ranks. Relatively smooth.
Stipule scars: Narrow lines at angles of leaf-scars.
Leaf-scars: Raised, oval to crescent-shaped, somewhat corky.
Bundle-scars: 3, distinct, separated.
Twigs: Slender, zig-zag, with pith that is closely diaphragmmed.

Alternately Budded Twigs

Stipule Scars Lacking

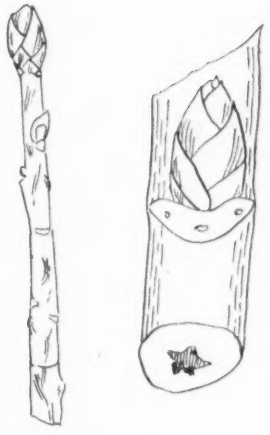
With Terminal Buds Present



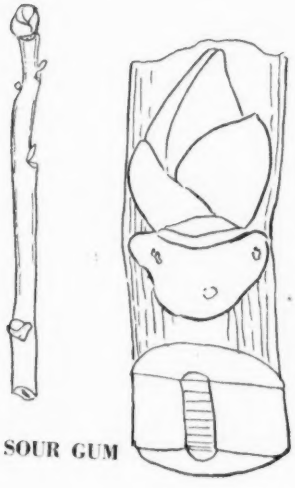
BUTTERNUT

WALNUT

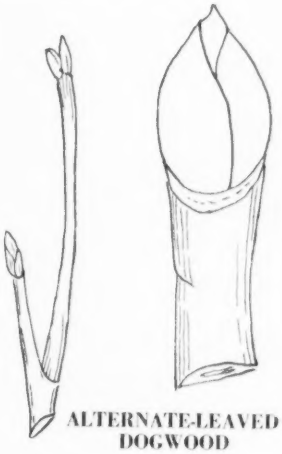
BLACK WALNUT



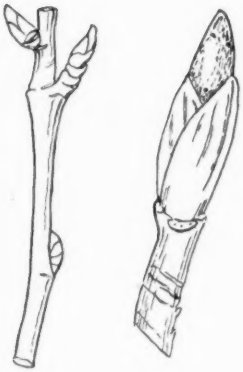
SWEET GUM



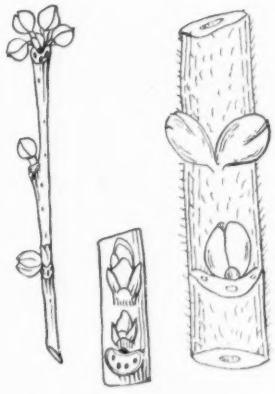
SOUR GUM



ALTERNATE-LEAVED DOGWOOD



MOUNTAIN ASH



SPICE BUSH

WALNUTS

Juglans sp.

Buds: Terminal of white or butternut long oval like the nut; of black, spherical like the nut.
Bud-scales: Usually show 2 to a bud, mealy in appearance, grayish.
Leaf-scars: Elevated considerably, usually conspicuously 3-lobed, with decurrent lines from extremities.
Bundle-scars: Usually in groups of 3 little crescents.
Twigs: Coarsely wrinkled. Pith diaphragmmed.

SOUR GUM

Nyssa sylvatica

Buds: Varied in size from small, often superimposed, laterals to large, plump terminals.
Bud-scales: Usually with about 4 scales exposed, closely pressed.
Leaf-scars: Broadly crescent-shaped or heart-shaped, slightly raised.
Bundle-scars: 3, distinct and separated.
Twigs: Pith somewhat diaphragmmed.

MOUNTAIN ASH

Sorbus aucuparia

Buds: Terminal, large, slender cones. Lateral often reduced and obscure, certainly not conspicuous.
Bud-scales: Outer scales of terminal smoother than the inner, which may be gummy, hairy, fuzzy or matted.
Leaf-scars: Narrow ovals, not too conspicuous.
Bundle-scars: 3, distinct and separate.
Twigs: Rather coarse, dark, with brownish pith.

SWEET GUM

Liquidambar styraciflua

Buds: Lateral less conspicuous than terminals, often flattened to twig.
Bud-scales: More or less 2-ranked, pointed, sometimes gummy.
Leaf-scars: Narrow crescents, swollen, but not greatly.
Bundle-scars: 3, distinct and obvious.
Twigs: Conspicuously corky ridged and roughened. Pith rather distinctly star-shaped.

ALTERNATE-LEAVED DOGWOOD

Cornus alternifolia

Buds: Most dogwoods are opposite budded, but this one is not. Buds are most conspicuous at tips of twigs and are oval and pointed.
Bud-scales: Pointed, only 2-3 showing to a bud.
Leaf-scars: Narrow crescents, inconspicuous.
Bundle-scars: Many in a slender, curved line.
Twigs: Erratically branched with alternating long and short internodes.

SPICE BUSH

Lindera benzoin

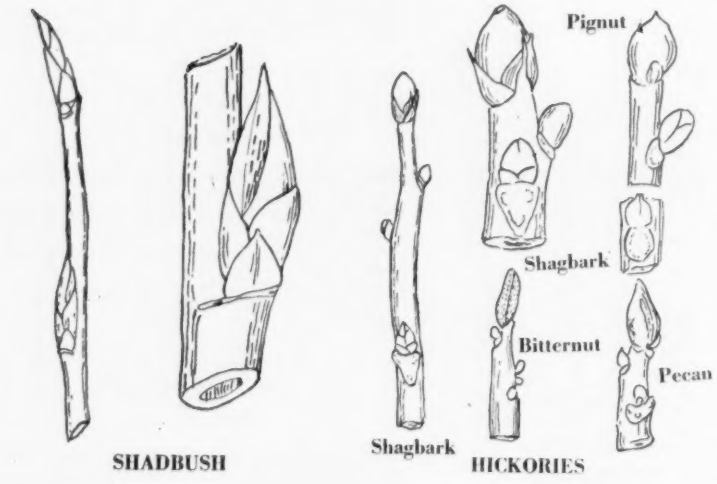
Buds: Stalked, often superimposed and frequently borne in clusters that are crowded. Looks like bunch of tiny, stalked balloons.
Bud-scales: Appear to be 2 hemispheres enclosing the buds.
Leaf-scars: Broad ovals, slightly swollen, conspicuous.
Bundle-scars: 3 or sometimes more, or sometimes crowded together.
Twigs: Dark green, spotted, aromatic, rubbery, will burn green in fire.

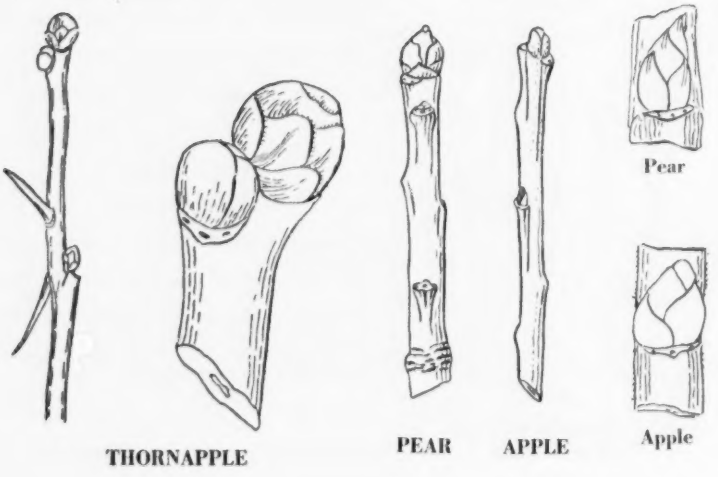
Alternately Budded Twigs

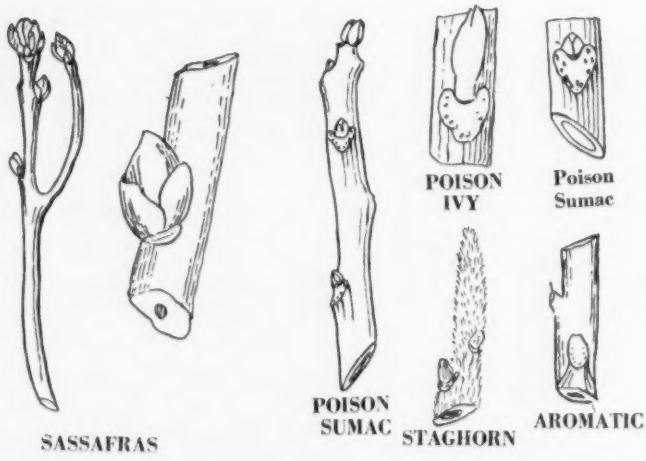
With Stipule Scars Lacking

With Terminal Buds Present

(Terminal bud may be lacking in some Pyrus and some Rhus)







SHADBUSH

Amelanchier sp.

Buds: Slender tapering cones with greatest diameter at base; something like small beech buds that are widest above base.
Bud-scales: 5 or 6 exposed, the smallest and shortest at base.
Leaf-scars: Narrow crescents extending beyond base of buds. 2-ranked.
Bundle-scars: 3, widely separated.
Twigs: Slender, often shedding a thin surface.

THORNAPPLE

Crataegus sp.

Buds: Variable in different species but usually blunt or plump spheres.
Bud-scales: Blunt, close, short and variable.
Leaf-scars: Narrow, triangular, with width usually less than that of adjacent bud.
Bundle-scars: Three, widely separated and, of course, distinct.
Twigs: Tough, stiff, usually light colored, often armed with spines that may be modified twigs developing from buds not stipules.

SASSAFRAS

Sassafras variifolium

Buds: Plump, pointed ovals somewhat divergent, often appear loose.
Bud-scales: About 4 exposed, with suggestions of keels on back, appear to be fleshy rather than dry.
Leaf-scars: Semicircular to crescent shaped with appearance of being raised.
Bundle-scars: Apparently one, or made up of many small, crowded scars forming a line.
Twigs: Green, branching often near tip, rubbery, fragrant when broken.

HICKORY

Carya sp.

Buds: Usually large. Terminal of shagbark larger than of pignut; of bitternut, sulphur yellow; of pecan less glandular yellow. Lateral buds commonly superimposed.
Bud-scales: Notice illustration for shape differences, and, particularly, length of lower scales in pignut and shagbark.
Leaf-scars: Broad and conspicuous.
Bundle-scars: As shown in pictures.
Twigs: Generally coarse, stiff.

APPLE and PEAR

Pyrus sp.

Buds: Terminal buds in the genus may be absent or present. Buds plump and usually blunt.
Bud-scales: Smooth in pear and often fuzzy in apple, about 4 scales show in developed bud.
Leaf-scars: Narrow crescents or ellipses and sometimes decurrent at middle.
Bundle-scars: 3, distinct.
Twigs: Medium coarse, often swollen slightly at joints. Scales of apple sometimes margined; of pear, not.

SUMACS and kin

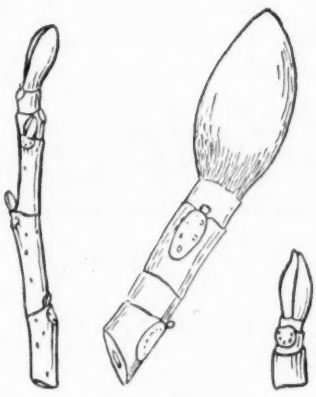
Rhus sp.

Buds: Various as illustrated. Terminal bud present in aromatic sumac but absent in most others.
Bud-scales: Hair-like in staghorn sumac, like folded leaf in poison ivy.
Stipule-scars: Lacking.
Leaf-scars: Usually raised and often surrounding the bud.
Bundle-scars: Numerous, usually in a U-shaped line or open ellipse.
Twigs: Coarse except in aromatic sumac.

Alternately Budded Twigs

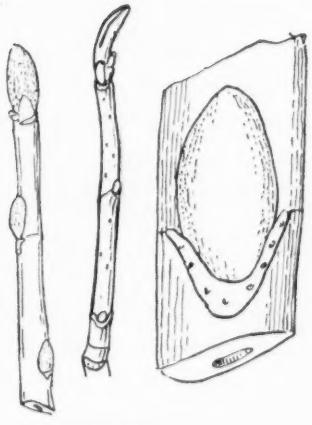
Stipule Scars Present

Terminal Buds Present

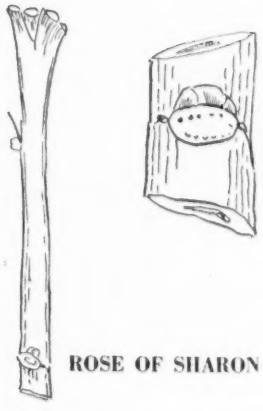


TULIP POPLAR

BEECH



MAGNOLIA



ROSE OF SHARON

Cottonwood

Cottonwood

White

Trembling

Big-toothed

POPLAR

RED

CHESTNUT

OAK

Black

Scarlet

White

TULIP POPLAR

Liriodendron tulipifera

Buds: Usually solitary, but sometimes placed one above another, large or small with lateral the smaller.
Bud-scales: 2, exposed, cover bud.
Stipule-scars: Encircle twig as a line.
Leaf-scars: Broad, variously shaped, moons, ovals or crescents.
Bundle-scars: Numerous, scattered or in irregular ellipse or oval.
Twigs: Rather coarse, weak, somewhat rubbery, smooth, with partitioned pith.

MAGNOLIA, CUCUMBER TREE

Magnolia acuminata

Buds: Conspicuous, much longer than wide, with terminal the largest.
Bud-scales: 1, somewhat silky.
Stipule-scars: Encircle twigs as lines.
Leaf-scars: Deep crescents, relatively narrow, not raised.
Bundle-scars: Many, scattered in some species, but in U-shaped line here.
Twigs: Rather coarse, rubbery, nearly round in cross-section.

POPLAR

Populus deltoides et al

Buds: Coarse, sometimes sticky.
Bud-scales: About 3 exposed in laterals.
Stipule-scars: Small, inconspicuous.
Leaf-scars: 3-lobed, rather broad.
Bundle-scars: In 3 separated groups. Trembling P. has smooth, maybe gummy, buds; White P. has gray, fuzzy buds and twigs; Big-toothed P. has smooth twigs and silky or fuzzy buds.

BEECH

Fagus grandifolia

Buds: Slender, tan, widest at about middle, pointed, divergent.
Bud-scales: About 10 or more exposed, close, medium blunt at tip.
Stipule-scars: As line beside leaf-scar.
Leaf-scars: Semicircular to crescent, on enlarged part of twig.
Bundle-scars: Usually in 3 groups that are separated.
Twigs: Slender, zig-zag, brown.

ROSE OF SHARON

Hibiscus syriacus

Buds: Not evident and often not visible because hidden by leaf remains or other structures.
Stipule-scars: Small obscure ellipses.
Leaf-scars: Transverse ellipses or circular, conspicuously raised on ends of decurrent ridges.
Bundle-scars: Many or in about 4 groups, some being compound.
Twigs: Round in cross-section or somewhat fluted, or round ridged, ending in expanded tip.

OAKS

Quercus sp.

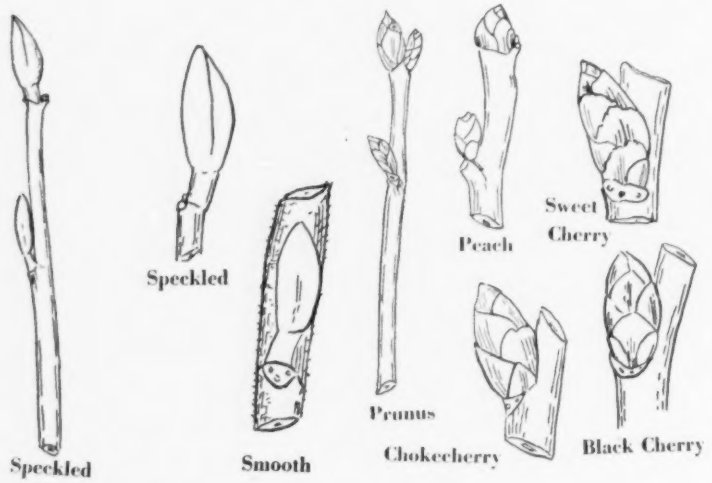
Buds: As illustrated in the different species, but in general red oaks have more pointed buds than white oaks. Not always the case, however.
Stipule-scars: Small and obscure.
Leaf-scars: Usually capping swellings.
Bundle-scars: Many, scattered or in irregular ellipses.
Twigs: Usually stiff, fluted, with swollen, many-budded tips, pith obscurely star-shaped.

Alternately Budded Twigs

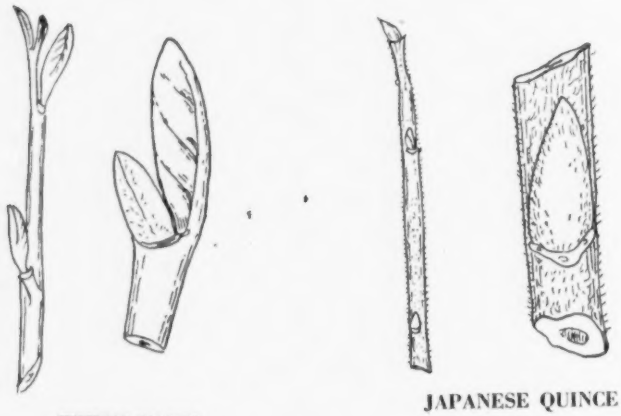
Stipule Scars Present

Terminal Buds Present

(Terminal bud may be lacking in some Betulas and in some Prunus)



ALDER



WITCH HAZEL

JAPANESE QUINCE

NEW JERSEY TEA

BIRCH

ALDER
Alnus sp.

Buds: Large, commonly stalked, looking somewhat like 2 clasped leaves.
Bud-scales: 2 or 3, dark brown, apparently thick, scales.
Stipule-scars: Narrow lines extending from edges of leaf-scars.
Leaf-scars: Raised, semicircular to triangular with face at angle with twig.
Bundle-scars: 3 or more with the center one often compound.
Twigs: Of smooth alder, fuzzy; of speckled alder, smooth.

WITCH HAZEL
Hamamelis virginiana

Buds: Stalked, finely roughened to felty, good sized, flattened.
Bud-scales: Exposed stipular scales or leaf-like structures.
Stipule scars: Of the pair one is round and one long and slender. Stipules may persist for some time.
Leaf-scars: Semicircular to 3-lobed, raised, not always obvious.
Bundle-scars: 3 with some compound at times.
Twigs: Gray-brown, tough, finely hairy or sometimes glossy.

NEW JERSEY TEA
Ceanothus americanus

Buds: Relatively small, pointed, egg-shaped, divergent.
Bud-scales: Stipular scales, smooth; inner bud-scales hairy.
Stipule-scars: Small, narrow and obscure, or covered by persistent stipules.
Leaf-scars: Raised, semicircular, small, under ½ size of bud.
Bundle-scar: 1, relatively large, filling leaf scar rather well.

PEACHES and CHERRIES
Prunus sp.

Buds: In apricots and plums, no terminal bud; in cherries and peaches terminal bud usually present.
Bud-scales: Distinct, close, compact.
Stipule-scars: Often reduced to a trace that seems to continue leaf-scar.
Leaf-scars: Usually crescent-shaped, raised and relatively small.
Bundle-scars: 3, separate and distinct, or in some species compounded.
Twigs: Usually with sharp, bitter-tasting bark. Peach finely speckled.

JAPANESE QUINCE
Cydonia japonica

Buds: Appressed, slender, pointed, average sized.
Bud-scales: 1 or 2 exposed, brown, hairy.
Stipule-scars: Small, slender, inconspicuous.
Leaf-scars: Small, U-shaped, raised.
Bundle-scars: 3, separated.
Twigs: Dark, slender, grooved, somewhat fuzzy.

BIRCH
Betula sp.

Buds: Terminal usually shed, except on ends of short spurs, where it is conspicuous.
Bud-scales: Usually 2-3 exposed, except as shown in illustration.
Stipule-scars: Narrow and usually inconspicuous.
Leaf-scars: Narrow, crowded on short spurs, usually 2-ranked.
Bundle-scars: 3, commonly indistinct.
Twigs: Often fragrant as of wintergreen, especially in Black and Yellow B.

Billboards and the Modern Highway

THE following two paragraphs are quoted from the essay, "How to Plan and Pay for Better Highways," with which Robert Moses, New York City Commissioner of Parks, won a prize of $25,000 in the recent contest sponsored by General Motors. These are words that should be taken to heart by every American whose tax dollars are going into the building of throughways, expressways, and modern highway arteries, or who is paying toll to travel on fine new, high-speed highways.

"Any program of highway expansion and improvement, especially one involving new routes and rights of way, which does not face frankly and firmly the menace of indiscriminate billboard advertising will not have sustained public approval. Intelligent women in particular have profound convictions on this subject. Honest public officials of long experience are increasingly fed up with glib assurance of cooperation from billboard companies and advertisers who have little regard for either safety or preservation of the landscape. Parkways are already more or less protected by wide rights of way, state laws, and local zoning ordinances and easements, but most laws governing new mixed traffic arteries including toll roads have been rigged with weak sign and billboard provisions or stripped of all such regulations.

"The billboard companies have shrewdly sought the aid of farmers and other adjacent owners who seize the opportunity to pick up a few fast dollars, and of unions engaged in putting up and painting signs, to defeat regulatory bills and prevent effective administrative rulings. Since there are many other more promising media, advertisers seem much less interested in plastering the highway system with appeals for their wares than the billboard companies claim. In terms of safety and public support, it is essential to curb the billboard interests from the very start. Road building at best brings with it some undesirable features. If every highway is to become just a gasoline gully, those who live and work nearby and those who drive for pleasure and with some respect for scenery, are going to be more and more in favor of putting the new roads somewhere else or drastically limiting their construction."

Hand in hand with the building of these highways goes the question of how their immediate environs may be controlled. Modern planning calls for limited access, no crossroads, merging traffic at points of ingress, and control of the character and amount of business activity and structures along the route. Wide rights of way are essential to meet the needs of the modern expressway and to assure control of the highway environment. And one thing that has no place along the modern expressway is the distracting and defacing billboard. It is also a parasite capitalizing on a public investment running into the billions.

Faced with a growing public appreciation of the safety menace inherent in the distraction of attention caused by the billboard, the outdoor advertising industry is fighting a determined defensive battle in the lobbies of legislative halls to thwart regulation through enactment of restrictive laws.

The industry is also trying by devious means to divert or defeat public opposition. It has dreamed up the phrase "highway hypnosis" and cleverly planted the thought in magazine articles, including one in the widely read *Reader's Digest*, at one time active for the preservation of the amenities of the highway. According to this bit of buncombe, the highway traveler is supposed to need billboards to keep him awake.

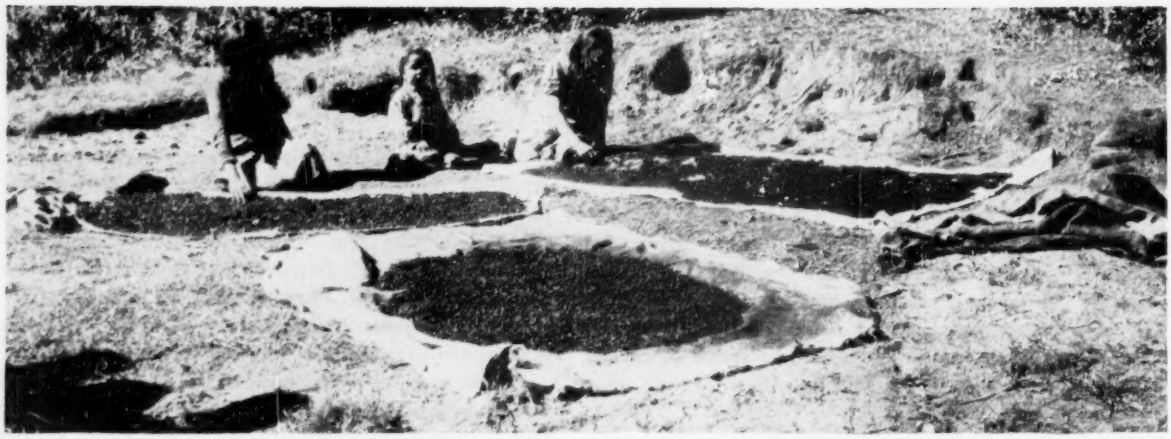
Cooperation, as mentioned by Mr. Moses, is another device used by the industry to short-circuit regulation and to divert public opposition. It has never worked because it is never based on a sincere intention on the part of billboard interests really to safeguard the highway environment.

The industry also urges representatives of outdoor advertising companies to become members of planning boards and zoning commissions, for obvious reasons. Free space on idle boards is given to drives of many sorts, and to educational and civic programs. These gifts always have a usually unseen string attached, for when any opposition to the outdoor advertising industry arises key people to whom the space was given are reminded of their indebtedness to the industry.

It would seem that some such club is being held over the head of the Pennsylvania Turnpike Commission, since that toll road, despite its spectacular scenery, continues to be defaced by sign boards, large and small. And the outdoor advertising industry zealously circulates the falsehood that such a policy is followed because the Commission feels that the billboards keep the drivers of automobiles awake. The New Jersey Turnpike Commission, on the other hand, has steadfastly refused to sanction billboards. One that was erected was promptly screened by a large canvas frame and came down.

There is no question about the public's distaste for the billboards along our rural highways. A survey by the American Automobile Association showed ninety percent of those interviewed favoring restriction of such invasion of the countryside. And a survey in Virginia revealed the eighty-four percent of the people interviewed stated that they were not influenced in their purchases by highway advertising. This should be of much concern to the advertiser.

Americans will never be able fully to have safe and enjoyable travel over highways in which they have made a tremendous investment until the billboard is properly restricted to areas of low speed and definitely commercial character. There is ample precedent in legal decisions and in existing statutes for such restriction, and in a democracy the substantial majority who resent the billboard should see to it that those who represent them in legislatures know about this opposition.



U.S. FOREST SERVICE PHOTOGRAPH

Indian children help to dry berries at the Surprise Lakes Camp reserved for them in the Gifford Pinchot National Forest, Washington.

Northwest Indians' Berry Rights

By WILLIAM H. OSBORNE

WILD berries of many varieties furnished food for the original inhabitants of our Northwest. The thimbleberry, salmonberry, blackberry, dewberry and cranberry all played a part in the economy of the Indians and the pioneers. But of all the wild berries that were indigenous to the Northwest the most important are still those which we indiscriminately call blueberries and huckleberries. Because these berries were easily preserved, and were rich in flavor and sustenance, they were the favorites of the Indians. Because the bear ate many berries and was able to withstand the cold of winter so well, many Indians believed that eating berries would make them immune to the chills of winter.

The Indians of the Northwest were rich as far as their economic necessities were concerned before the white man arrived. There was an abundance of food for all. But the flesh of salmon, deer, bear, elk, and the roots of tule, skunk cabbage and camas all tasted better when mixed with fresh or dried berries. And while the men hunted the winter meat supply the women and children picked berries.

Along the coast there were cranberries, *Oxycoccus oxycoccus*, in the sphagnous bogs. In the swamps of the coast mountains the western blueberry, *Vaccinium uliginosum*, was hunted. Red whortleberries, *Vaccinium parvifolium*, were rather generously scattered over the Northwest in lower elevations. These were picked by coastal and interior tribes. A blue whortleberry, *Vaccinium ovalifolium*, grew in the deep woods of the coast range and they were the most sought after of all coastal berries.

The tribes of the interior valleys and the Cascade range did not have as many varieties of berries, but they had more dense blueberry fields in which to pick. Their favorites were the mountain bilberries, *Vaccinium membranaceum* and *Vaccinium deliciosum*. Both are large berries reaching a size of nearly one-half inch in diameter when matured. These berries ripen from August to October. The Indians preferred the prime berries, but some picking was done after the autumn frosts hit.

Botanists now generally agree that the so-called American huckleberry represents a transition of the word whortleberry, to hurtleberry, to the simplified huckleberry. The terms huckleberry and blueberry are used rather synonymously in the Northwest to describe all nine species of the genus *Vaccinium*. True huckleberries, *Gaylussacia*, of course, do not occur in our Northwestern States.

Spring, summer and fall were all harvest seasons for the Northwest Indians. From November to March the steelhead trout, or sea-going rainbow trout, migrated from the Pacific to their natal streams to spawn. They were netted as they fought their way up the rivers, or speared on their gravelly spawning beds. At other times of the year salmon, whale, seal, venison, roots and berries were dried and stored for winter food. Oil rendered from whales, seals, salmon and steelhead served as cream, butter and salad dressing for the Northwest Indians.

These Indians were conservationists. They did little planting or cultivating but they treated the wild berries as a crop. They would pick only the best berries and only what they needed, leaving some for seed and food for the birds and bears. In selected areas they carefully

Indian woman drying berries after scooping earth from beneath a log to form a mound on which rests a tule mat. Note the three types of baskets. Below, another method of drying berries using reflected heat. A rotted log burns slowly so the berries are not cooked.

U.S. FOREST SERVICE PHOTOGRAPHS

burned out old berry shrubs that no longer bore fruit. New and more vigorous shrubs would take their place in a few years assuring the Indians a perpetual and important crop.

Picking the small berries one at a time was a tedious job. The coastal Indians designed a comb-like instrument made of wood to rake the berries from the plants into baskets. To separate the dirt and leaves from the berries they would wet the inside of a piece of cedar bark and tilt it slightly on one end. The berries were poured slowly on the bark and would roll down into a basket. Leaves and dirt would stick to the wet bark.

There were three methods commonly used by the Indians for drying berries a few generations ago. Perhaps the most ingenious method was the use of tule mats, which were set at an angle on a mound of earth before a fired log, utilizing reflected heat. When fire was used to dry berries it was important to select a well-rotted log so the fire would burn slowly. Too much heat would cook the berries, and there was also danger of starting a forest fire. The space between the tule or wood sticks allowed air to circulate and cool the berries as they were heated and stirred. When dried a large huckleberry shrinks to the size of a grain of rice. When soaked in cold water they expand back to normal size.

Only a small number of Northwest Indians still dry berries in the old, traditional ways. In most places the tule mats for drying have given way to screen wire stretched over four stakes driven into the ground. Most of the crop is canned. Many Indians take their cans and equipment to the fields with them and can their daily harvest each night. Others take their berries home after a few days of picking, and, after canning them, return to the fields. In a few cases the modern electrical deep freeze has become a fixture in the Indian home. But among the older people tradition is strong and old methods of drying are still used by them.

A few generations back the greater share of the wild berry crop was harvested by the Indians. Nowadays the Indians are definitely outnumbered in the berry fields and account for not more than twenty percent of the berry crops. Construction of improved forest roads and mountain trails in the late 20s and 30s made the fields more attractive to the urban population for a summer outing. Market prices of berries enticed commercial pickers in large numbers. In certain areas that the Indians formerly had to themselves they resented the encroachment on their age-old berry fields, and some friction developed.

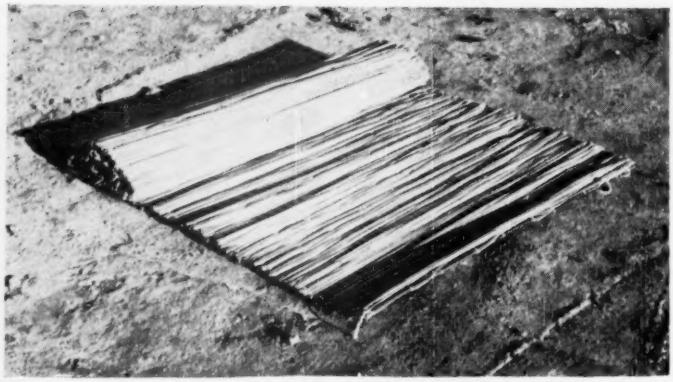
One example of conflict and diplomacy was note-

worthy. For centuries many Indians from various parts of the Northwest had traveled on horseback to the Twin Buttes area of Mt. Adams, now in the Gifford Pinchot National Forest, formerly known as the Columbia National Forest. In 1926 a forest road was built from the Columbia River highway into the Twin Buttes area. White pickers in automobiles appeared in great numbers that year. The Indians were angry at this intrusion. Clashes occurred and something had to be done. The Forest Supervisor, Mr. F. V. Horton, patiently negotiated with the Indians and arranged a parley to find a way out that would be satisfactory to all concerned.

Mr. Horton arranged with the Superintendent of the Yakima Indian Reservation, adjoining the berry country, for a meeting with the Indians at Cold Springs in August, 1927. Chief Willie Yallup of the Yakima tribe was spokesman for all the Indians. The historic parley lasted two days, with all the usual ceremony connected with such affairs. The Indians were offered three areas in the National Forest as their exclusive territory. They chose the Meadow Creek, Cold Springs and Surprise Lakes areas. The "treaty" provided that these areas would be set aside for all time for the exclusive use of Indians. All tribes of the Northwest may pick in the "treaty" areas, but the principal pickers are from the Yakima, Umatilla, Nez Perce, Warm Springs and Cayuse tribes. The present Forest Service supervisor, Mr. Karl C. Langfield, has no difficulty enforcing the treaty.

The Forest Service is custodian of the most valuable berry fields in the Northwest. The money value of the wild crop is estimated at more than $500,000 annually. Much of the crop is never harvested because of inaccessibility of some areas, or because of occasional heavy summer rains. In their exclusive "treaty" area near Mt. Adams, the Indians harvested nearly $40,000 worth of berries in 1951. It is estimated that they harvest around $10,000 worth of berries in the Mt. Hood National Forest each year.

Forestry officials and conservationists consider the berry plant one of their best assistants. After a burn the berries are the first vegetation to appear from the ashes. They help to prevent soil erosion and they furnish shade for young trees while they are getting started. The wild berries of the Northwest are one of Nature's partisans in helping to restore the balance in a cycle of forests, fires and reforestation.



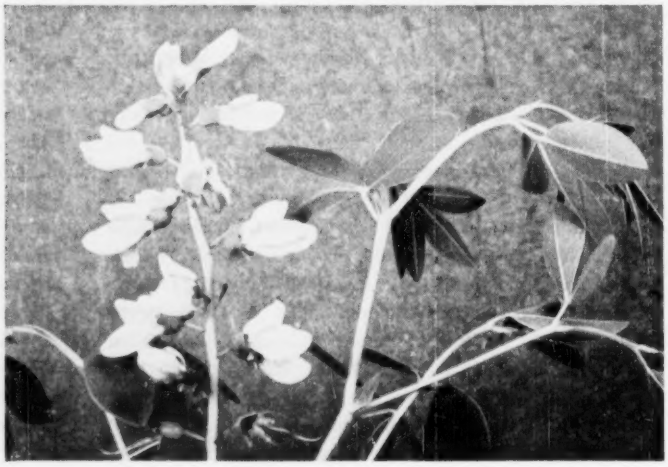
PHOTOGRAPH BY DR. DAVID H. FRENCH

A tule mat of the type widely used by Northwest Indians for drying roots and berries. In the 1890s the crossrods were of wood, probably of the giant or yellow cedar.

Wild Indigo

By RALPH J. DONAHUE

Photograph by the Author



WILD indigo has a creamy-white flower that blooms from middle June through July. It is a member of the widely distributed Pea Family, and is related to such varied-appearing kindred as the redbud and sensitive brier. The scientific name is *Baptisia pleucantha*.

The several species of wild indigo make interesting and beautiful additions to the home wild garden plot, where the blue-flowered and the white sometimes hybridize with each other.

The plant shown here grew to the height of three feet. The light creamish flowers looked like tiny white boxing gloves before they opened. As the plant's leaves dried, they gradually turned to a gray-black.

While the wild indigo occurs over an area between Michigan and Minnesota southward to Louisiana and Texas, cattlemen do not welcome it. Under certain conditions, the young plants are injurious to livestock. The indigo of commerce comes from a tropical species.

Two Indian Kingfishers

By LT. COL. C. L. BOYLE

Left and right, showing its breast and back, are pictures of the white-breasted kingfisher of India. Below is the sub-species of the pied kingfisher found in India.

IT HAS been said that the birds of India have more character, are tamer and thrust themselves more upon one's notice than do English birds. This is certainly true of the white-breasted kingfisher, with its shining blue wings, chocolate-colored body and huge red bill. Add to this its loud, ringing call and we have a distinctive bird indeed.

The white-breasted kingfisher, *Halcyon smyrnensis*, ranges from Asia Minor through India and Ceylon to south China. Unlike most kingfishers it is not restricted to the waterside; in fact, it is more at home in garden or forest clearing. It is eleven inches long and the sexes are alike. It never hovers but glides from its perch to the ground, returning with an insect, or other small animal. Occasionally it catches a fish.

The photographs here were taken at Kansrao in northern India. The kingfishers' nesting hole was in the bank just behind and above the branch on which

they have perched, and thus posed for a picture. The pied kingfisher, *Ceryle rudis*, is a little larger than the white-breasted and has an even greater range—from Egypt to China. The species is divided into many races of which *C.r.leucomelanura* inhabits India and other countries farther east. Its food is small fish, for which it searches over lake or river. Seeing one, it checks its flight, hovering with body slanting upward and bill pointing vertically downward. Suddenly it plunges on its prey and, if successful, flies off with the prize, often tittering with delight.

The birds shown here were nesting in a small sand cliff near the Anchar lake in Kashmir. Several pairs had made their holes within a few feet of each other.

Lignum Vitae

By COL. ROBERT BRUCE WHITE

THOUSANDS of cruise ship visitors to the Virgin Islands arriving on the quay at Charlotte Amalie have admired the blue-flowering trees greeting them in nearby Emancipation Square. By no means a rarity in the West Indies, this fine ornamental tree, of which there are two principal species, is found all the way from Florida to Venezuela, and abundantly around Kingston, Jamaica. Time was when no timber was more eagerly sought by visitors to these shores, for in world markets the logs once commanded the fabulous price of seven gold crowns per *pound*.

Lignum vitae is a tree with a past. And the reason for its extraordinary fame is explained, in part, by its common name, which is Latin for wood of life. Its generic name, *Guaiacum* is aboriginal West Indian having the same meaning; and the Spanish *palo santo* means holy wood. In 1514, when Ponce de Leon was still searching for the Fountain of Youth, the Spanish chronicler de Olviedo y Valdez reported amazingly potent medicinal properties derived from this tree. It was said to cure almost anything.

Two hundred years later Sir Hans Sloane, distinguished British physician and botanist, author of *The Natural History of Jamaica*, prescribed the use of its bark as a cathartic, the fruit as a purgative, and the flowers (in syrup) as a laxative for children. Its sap he recommended for gout and rheumatism. He also wrote: "And when the Wood is boil'd in Water and drank for many Days, Mornings and Evenings, is good for Diseases of the Liver and the Breasts, especially their anciente Obstructions, being of subtle and hot Patts; and the white juice coming forth from the Bark is good against a scal'd Head."

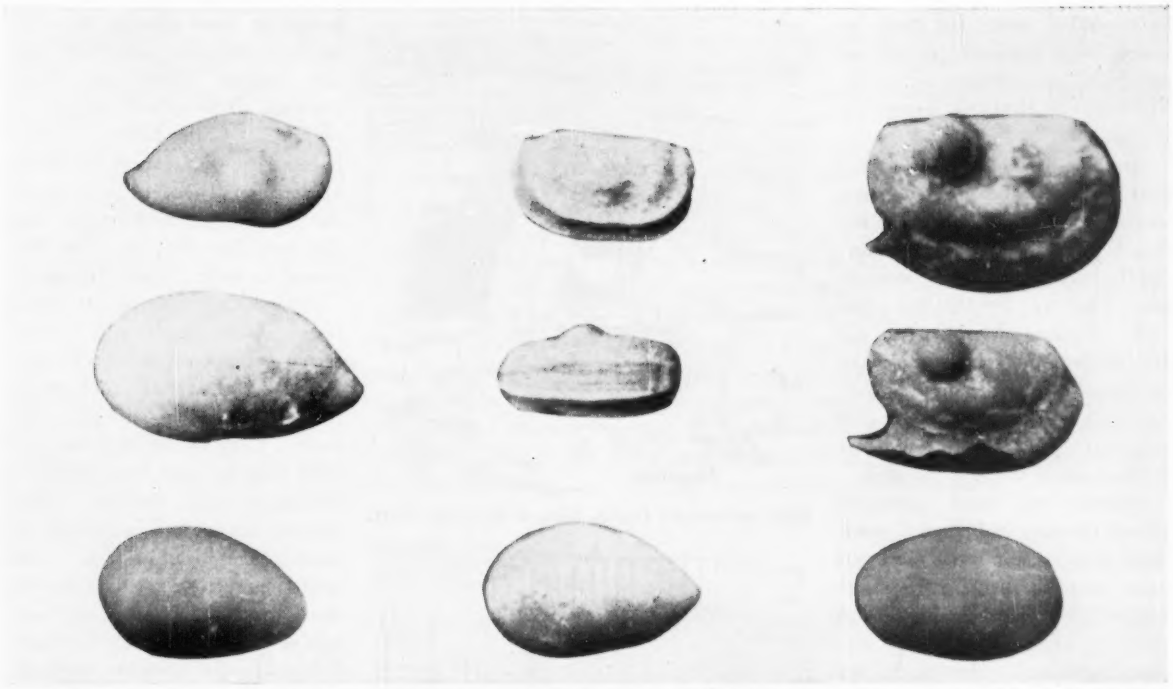
Said the Reverend G. Hughes in his *Natural History of Barbados*, 1750 edition: "Its medical Virtues are described by many Authors . . . but the Berries, which are of testicular form, make an excellent Diet Drink, greatly assisting to purify the Blood." The spectacular fame and almost incredible prices commanded by this wood were explained by a rumor, originating in the West Indies, that it was a sure cure for the French pox or syphilis. This was, of course, sheerest fiction.

PHOTOGRAPH FROM CARIBBEAN STUDIOS

Lignum vitae, the wood of life, growing in a park at St. Thomas in the Virgin Islands.

All this was long ago; but there is still a small demand for gum guaiacum, a green resin naturally exuded from the tree, or obtained by incisions. But the real value of the wood is found in its great durability and hardness. Weighing 76 pounds per cubic foot, it is the heaviest of all woods. Many a marine engineer will assure you that, despite all modern progress in bearing design and lubrication techniques, there is nothing like the tough, brownish-green heartwood of lignum vitae for the stern tube bushings of his ship's propeller shafts. Manufacturers of bowling balls and rulers, pulleys, mallet heads and gavels, have depended on it for generations. Plastics have cut into this market, but there is one small item plastics should never touch—the wassail bowl. To make such vessels from anything but beautifully cross-grained lignum vitae, and to drink your health from anything but the wood of life would be sacrilege indeed.

The tree is slow-growing, with smooth dark foliage, and is compact, well-shaped, distinctly ornamental. Because of its strength and durability, it has survived West Indian hurricanes that have destroyed all neighboring growth. Even if its fame has greatly diminished through the years, the tree has lost none of its beauty. And when it is in bloom, with great rich clusters of bright blue, starred blossoms, you will not only salute it for its fame in the past, but agree that in the future such beauty should be seen in far more plantings.



Typical ostracods from the Pennsylvania geological period, which occurred approximately 210,000,000 years ago. The Pennsylvania period was the last period of the Paleozoic era. These specimens from the author's private collection have been magnified to forty times their actual size.

"Herman," Fossil Clue to Oil Riches

By MARIAN ROGERS

Drawings by Martha McGinnis

THE ostracod is an odd crustacean so tiny that it will fit on the head of a pin. In fact, it looks like a seed and is known popularly as a "seed shrimp." But, despite its tiny size, do not ever sell the ostracod cheap. When he is 500,000,000 years old, the ostracod is a prime clue to petroleum treasure.

Most of us know only the barest details of the fantastic search for oil that goes on continuously. It is the most fabulous of fortune hunts. To find this precious fuel, the petroleum industry today depends upon science, and fossil hunting is one of the best ways to trick Nature out of her "black gold."

Where prehistoric ostracods died, oil often lies hidden. The scientist's job is to stalk the Lilliputian fossil ancestors of present-day ostracods back through rock layers of time, using them to identify mineral deposits formed next-door to oil pockets that accumulated millions of years before the dinosaur roamed the continent. As a clue, the lowly ostracod can sometimes be an oil man's best friend.

Nature must have enjoyed herself when she fashioned the different ostracods. A peek at one through a microscope brings only chuckles. On the half-shell, one species looks like a tiny bathtub. Some have horns, and others resemble flea-sized watermelons.

Ostracod names are often descriptive and interesting. One of these is *Rigidella*, which suggests a female ostracod that imbibed too much prehistoric joy-juice and got petrified.

However, it is this strange-looking and oddly named crustacean that frequently is found peacefully sleeping with its fossil backsides in a huge bed of oil. It is this engaging habit that makes the oil business willing to pay wholehearted tribute to the ostracod.

Twentieth century ostracods live by the billions in our lakes, ponds and streams, in both standing and running water. They are tiny creatures, no larger than a pin-prick. Most kinds live on the bottom, but a few species swim above and may dart across the surface of the water when you are out fishing. Ostracods of today form a large sub-class, and they trace their ancestry to the fossil family tree that "grew" when great pools of oil were stewing in Paleozoic cooking pots.

Let us consider the fossil species, *Herrmannella*, which we might shorten to Herman. This little fellow can be a tell-tale sign pointing straight to oil. Geologists

have sniffed along his trail for years, hoping always to find an untapped petroleum reservoir. Very often Herman turns the spigot.

Herman was a lively ostracod that swam in the Devonian sea when it covered large areas of the North American continent during the mid-years of the Paleozoic era. That was 500,000,000 years ago. Herman did his stint for the modern petroleum industry by thoughtfully laying his wee carcass to rest at the bottom of a stagnant pool of water, left behind when the sea receded.

Millions of other ostracods joined Herman in his cozy, mud-lined crypt. While the mud and ooze slowly turned to stone around him, more animals and plants in the same rocks decomposed into oil. Sealed in his coffin, the ostracod became a fossil. Hundreds of millions of years passed before scientists learned that Herman, and other fossils, had cannily laid up treasures of oil for themselves in the earth. Now paleontologists instantly recognize Herman as a souvenir of the Devonian age. During Devonian times, some of the richest oil fields in North America were formed. The huge Edmonton field in Canada rests on an old Devonian sea bed.

Quickly cataloged, the ostracod has become as important to the oil industry as a fingerprint to Dick Tracy. Reading the story of fossils is a part of scientific oil-sleuthing that has replaced the haphazard drilling methods of seventy years ago. Using a microscope, the 1953 oil prospector studies fossils like Herman with the loving care of a miser eying his gold.

Unless the ostracod fossil is magnified, the human eye sees only a minute speck, equal in size to a grain of sand. This is the shell. Each species of ancient ostracod sports an individualistic shell, which may be either smooth and glossy, or granular. Nearly all prehistoric ostracods have

One ostracod looks like a watermelon.

Another prehistoric ostracod looks like a woman's purse.

Another ostracod resembles a tiny bath-tub when seen on the half-shell.

traces of sand clinging to their shells, a leftover from their seabed couch. Some are ivory colored, while others are brown or black. Color differences help to classify the several thousand species, but their study is rather difficult because of their size and the fact that they must be dissected in order to identify them.

Both living and extinct ostracods are so small you cannot measure one on a standard ruler. Most ostracods are not more than .10 of an inch long, at the most. They are bivalve animals with four to eight legs, used for swimming and feeding. You almost never find a school of ostracods swimming in cold spring water. Some live in the slimy mud and ooze at the bottom of lakes, as did little Herman. Ostracods are sociably inclined and move in swarms, either on or near the surface, or they creep along the bottom. In general they prefer shallow water. Next to copepods, they are the most abundant crustaceans found in the seas. Ostracods easily outnumber their distant relation, the shrimp.

The ostracod also has curious ways and bizarre sex habits. Some species eat both animal flesh and plants, while most of them feed mainly on algae, bacteria, molds and such. They are largely scavengers with a varied appetite. The female lays her eggs on the leaves of water plants, or on twigs, rocks or debris. These eggs possess tremendous vitality. Ostracod eggs have been known to hatch after being encased in dried mud for twenty years. Some species breed by means of an unfertilized egg, by what is known as parthenogenesis, while with other freshwater species there are both sexes, but males are more rarely seen.

Paleontologists can study ostracods for hours and never tire of them. For nearly a quarter of a century, ostracods have excited paleontologists the world

over. Their value to the oil industry lies in their terrific birthrate and their existence during almost every geologic period from the Ordovician to the present. Most prehistoric ostracods species died out, a fact that is a boon to the scientist. If the species overlapped into the different eras, the paleontologist would have a much harder time telling the age of prehistoric rock.

Prospecting crews of oil companies take sample corings as they drill through rock to reach oil traps. When ostracods are found in rock corings, the specimens are taken to the laboratory. Most oil companies have trailer laboratories that can be used by the technical staff at the well. Once in the laboratory, the rock is crushed and boiled to remove dirt and other foreign matter. Next these tiny fossils are carefully removed with a fine brush and placed under the microscope. The brush must be wet so the ostracods will stick to the bristles. Ostracods are so tiny that a pair of tweezers may be too large and clumsy to handle them.

In a twinkling the oil sleuth knows the age of the rock and the environment in which it was deposited. Certain species of fossil ostracods, of which Herman is an example, are characteristic of rocks known to contain oil. Finding a particular ostracod means the geologist is close to pay dirt.

Although other scientific means are used in the gigantic hide-and-seek game of oil hunting, paleontologists will probably be busy until the end of time with ostracods. Experts believe oil is still collecting in seed beds, drop by drop, in a slow process that takes billions of years. Meanwhile these fascinating little ostracods are dying by the millions and will point to new stores of oil for our children in eons to come.

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Alligator Juniper

By EDNA HOFFMAN EVANS

SOMETIMES common names are highly appropriate, and sometimes the scientific names of plants and animals strike a particularly apt note. This aptness of names is true in the case of one of the western junipers. Because of the peculiar cracks and indentations on its bark, the tree is popularly known as alligator juniper. The bark does resemble, in pattern and in color, the markings seen on the horny hides of these tropical reptiles.

The tree also is called oak-barked cedar, checkered-bark juniper, mountain cedar, and thick-barked cedar. This latter name is somewhat erroneous as a translation of the tree's scientific name, *Juniperus pachyphloea*. *Pachyphloea* means "thick-barked." While the names juniper and cedar are used interchangeably, juniper is the better one since true cedars are not found in the areas inhabited by the alligator-barked evergreens.

A native of the Southwest, the tree grows on dry mountain slopes between altitudes of 4000 and 6000 feet. It is the largest of the junipers and in favorable locations in Mexico, New Mexico, and Arizona, the trees reach a height of sixty feet and a trunk girth of as much as fifteen feet. One ancient giant, near Flagstaff, Arizona, attained perhaps a record, a trunk diameter of seven feet.

So far as commercial use is concerned, the alligator juniper does not loom large in the lumber industry. Its clear red wood, often streaked with yellow, is light, soft, close-grained, and brittle. It serves chiefly as firewood, or for pencil slats, garden stakes, and for fence posts. It is especially suited to the latter use because its heartwood resists rot for years. For this purpose it is as lasting as other durable woods like southern cypress, redwood, catalpa, black locust, chestnut, and osage orange.

This durability is obvious, too, in the living tree. Often one side of the trunk will die while the other side remains alive. The bark drops off the dead side, revealing the gray wood below, while the thick checkered covering continues to grow on the living side. Fire, too, may kill half the tree and leave the other half still growing.

While it cannot be classed as one of the most important of our forest trees, none the less, the alligator juniper can at least lay claim to being one of the most appropriately named members of the forest legion.

When the male narrowmouth frog bleats its song on rainy nights, it looks much like a bloated, animated chestnut. It is a small species, about one and a quarter inches long, or about five times the length of the creeping water bug.

Pinheads of the South

By JERRY D. HARDY, JR.

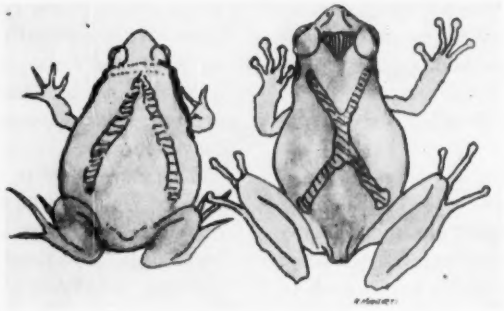
Illustrated by Romeo Mansueti

MANY years ago, on a warm, rainy, mid-summer night, I was mystified by what sounded like the voice of a sheep coming from the shallow water of a marsh at Cove Point, Maryland. At first there had been only the faint rustle of cattails, the fall of rain, and the distant rumble of waves. Then, quite suddenly, there came a new, mysterious sound. Certainly there could be no sheep within miles of this place, yet I distinctly heard a rich metallic "Baa"!

Moments later I discovered a tiny frog, half submerged in the water, clinging to a blade of tall marsh grass. Its throat was swollen into a shiny round bubble, half the size of the frog itself. Every few seconds the bubble would contract, resulting in a short piercing bleat, like the cry of a lost lamb.

It was a small, plump, toad-like animal that at first looked much like a bloated, animated chestnut. For a few moments it remained centered in the bright yellow radiation of my flashlight; then, as though suddenly aware of my presence, it blinked its eyes, lowered its head into the water, and swam clumsily away to disappear in a mass of dense marsh grass.

This was my introduction to one of the most interesting and least known members of the North American frog fauna. Most naturalists and herpetologists know it as the narrowmouth frog, *Microhyla carolinensis carolinensis*, yet its unusual characteristics and striking behavior have given it a vast array of popular names. To the people of North and South Carolina it is an infallible prophet of approaching rainstorms, and they have named it rainy-day frog, rain toad and Carolina tree frog. An old Negro from the Okefinokee Swamp, Georgia, once brought me a specimen, held delicately in a tin can at arm's length, which he declared to be "one a dem pi'sonous pin-headed frogs." Other country folk of the southeastern states, observing its striking appearance and color, have dubbed it narrowmouth toad and nebulous frog. To still others, the originators of such names as frog-toad and toothless frog, it shall remain forever a biological puzzle, being neither frog nor toad but a weird combination of the two.



The narrowmouth frog is frequently and appropriately called "pinhead" frog. The dorsal profiles of the narrowmouth (left) and the spring peeper (right) contrasts with the narrow, pointed head, and the relatively broad, "conventional" frog head.

Regardless of name, all who know the animal agree that it is a mite of an amphibian; a mere midget of a frog. Great-grandfather narrowmouths may reach a length of one and one-quarter inches; while their young descendants, recently transformed from a tadpole infancy, are seldom three-fourths of an inch long.

The narrowmouth is the clown of the tailless amphibians, as it has emerged from the long chain of evolution, a humorous and chubby little character. Its tiny head, terminating in a ridiculous-looking, pointed snout, is offset from the body by a conspicuous fold of skin just behind the eyes. Typical frogs have a tympanum; but the narrowmouth, as though wishing to maintain its radical individuality, entirely lacks this structure. Its characteristic color is restricted to shades of brown, gray or black, with an occasional deviation to brick-red or dark greenish-gray, but it can change, chameleon-fashion.

The narrowmouth is both a clown and a Columbus. It has gradually extended its range north to a point just sixty-five miles from the nation's capital. Should you seek a narrowmouth, you must limit your searching to the area south and east of a line drawn from Maryland, through Kentucky, Missouri, Iowa and Kansas, and on into eastern Oklahoma and Texas.

Herpetologists are an energetic, curious group of people who know no end of odd places in which to seek specimens. Thus they have pursued the tiny narrowmouth and found it living under an amazing variety of ecological situations. Gigantic logs and stumps in dense pine forests afford an excellent hiding place, as does the heavy leaf mold of deciduous forests. The frog's habitat varies from the rocky mountain slopes of Tennessee to lumber piles at Key West, Florida, where they live in company with skinks and geckos. If a hole is good enough for a crawfish, it is good enough for *Microhyla;* thus crawfish burrows are a favorite habitat in certain areas. Even the barren sea-beaches of Louisiana have occasionally produced specimens; and a great city was once known to play host to the species, for a breeding congregation was observed at Miami Avenue and 22nd Street in Miami, Florida!

With the exception of its great talent for rapid burrowing, the narrowmouth probably has less athletic ability than any other member of the amphibian world. It is not only a poor swimmer but is relatively slow and awkward on land. This is the result of its "Mr. Five-by-Five" proportions, its short, stout hind legs, and webless toes. If you should uncover a specimen near the breeding pond, you would probably laugh at the frenzied, clumsy movement with which it will scurry into the water. On the other hand, if uncovered in the forest outside the spawning season, they hop as do other frogs; but their hops are comically short and strained, generally carrying them a distance of two to ten inches. By way of comparison, the smaller cricket frog often escapes the pursuing hands of herpetologists with truly frog-like leaps three or four feet in length.

Dr. J. E. Holbrook, Father of American Herpetologists, was the first person to comment on the swimming ability of the narrowmouth by recording in his classic *North American Herpetology* that "it makes but a feeble chirp, and being but a clumsy swimmer if thrown into the water it repeats this chirp in its endeavors to escape." When disturbed during breeding periods, specimens often hide in the grass of shallow ponds. If the grass is forced beneath the water, they do not dive to the bottom as do other frogs, but swim slowly on the surface, making their capture painfully simple.

Autumn Equinox

By LALIA MITCHELL THORNTON

This is the fulcrum of the autumn days,
While beauty lingers in frost-darkened phlox;
And marigold and aster bloom. There comes
At its appointed time the equinox.

This is the end and also the beginning,
The wild geese fly tonight in wedge-shaped flocks;
This is the hour, the certain, the unchanging,
This is again the autumn equinox.

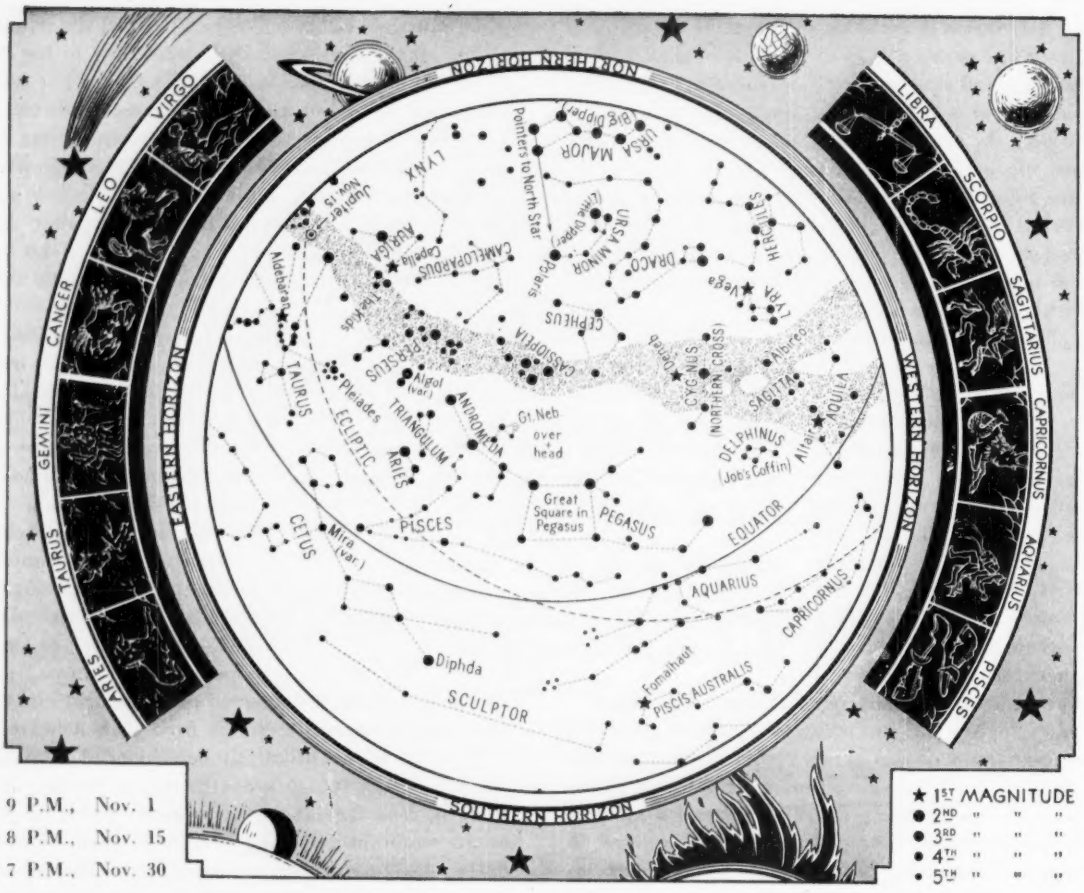
The private life of the narrowmouth, outside the breeding season, is virtually unknown. Scattered field notes suggest that they live rather solitary lives, feeding by night and sleeping beneath soil and surface debris by day. Thus far only one item of their diet is definitely known—ants. Remarkably enough, single individuals have been collected in the very heart of densely populated ant nests, where they are apparently protected from the acid bite of the insects by a noxious secretion from their delicate skin.

With the advent of fall, the cold-blooded, amphibious ant-eaters seek refuge beneath logs, or in pine stumps three or four feet above the ground, where they hibernate until the following March or April. Likewise, during the hot, dry, late summer months, they aestivate beneath the soil in cool forests.

Unlike most other frogs that breed during a short period early in the spring, the narrowmouth spawns intermittently during the summer months. The calling of the males is controlled by changes in humidity, and it is only on extremely damp evenings, just before a storm, that they begin their bleating choruses. The voice, which is audible for only fifty or sixty yards, has been compared not only to the bleating of sheep, but to the sound of an electric buzzer, and the harsh grating noise of pieces of metal being scraped together.

From observation it would seem that male narrowmouths must adorn themselves to win their mates. During the breeding period they develop a curious secondary sexual ornamentation in the form of small, elegant tubercles on the chin and lower jaw. This decoration accomplished, they begin their weird love song wherever they can find water. Here the clownish stupidity of the species is seriously exemplified by its bad habit of often spawning in transient waters that evaporate rapidly and result in desiccation of the eggs. An unusual breeding congregation was once observed in a shallow rain puddle in bare white sand. The males had burrowed into the sand and were calling with only their snouts protruding!

The female, larger of the sexes, deposits between 600 and 800 floating eggs in a large flat sheet on the surface of the water. Winds and (Continued on page 498)



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then, below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

Mercury Transits the Sun

By ISABEL M. LEWIS

One of the few occasions when the planet Mercury may be seen crossing the face of the sun, instead of, as usual, passing north or south of it at time of inferior conjunction, will be November 14, 1953. In the twentieth century this happens on twelve days only. It last occurred on November 11, 1940, and will not occur again until November 7, 1960.

Transits of Mercury can take place only when the planet is at or within a certain small angular distance of one of its two nodes, or points in which its orbit crosses the plane of the earth's orbit, and at the same time the earth is passing the line connecting these nodes. The earth passes the line of nodes of Mercury's orbit on May 8 and November 10 each year. Since Mercury's orbit is not circular, and the distance of Mercury from the sun is not the same at the two nodes, the conditions that permit a transit are different at the two nodes. Transits can occur only within 3 days of the May date, or between May 5 and 11, and within 5 days of November 10, or between November 5 and 15. The November transits occur more than twice as often as the May transits. After a November transit another November transit is possible in 7 years, likely to occur in 13 years, and practically never fails to occur in 46 years. Conditions for a May transit are much less favorable. A May transit cannot occur again after a 7-year interval and often will not occur after a 13-year period. The dates of May transits in this century are May 7, 1924, May 10, 1937, May 9, 1970, while November transits occur in 1907, 1914, 1927, 1940, 1953, 1960, 1973, 1986, 1999, giving a higher than usual average of 3 to 1.

Venus, the only other planet whose orbit lies between that of the earth and the sun, also transits the sun, only under much more unfavorable circumstances and at rare intervals. The earth passes the nodes of the orbit of Venus on June 5 and December 7. If the transit is nearly central across the disk of the sun no other can occur at the same node for 235 or 243 years. There may be, however, another transit of Venus at the other node in about half of that time. If the planet transits near the northern or southern edge of the disk there may occur another transit 8 years earlier, or later, at the opposite edge of the disk, as has been happening for several centuries. The last transits of Venus were in December, 1874 and 1882, and the next will not occur until June, 2004 and 2012, at the opposite node.

Venus is visible without telescopic aid when in transit as a "black drop" against the surface of the sun. Its atmosphere is clearly in evidence at time of first and last contact with the disk of the sun. The planet Mercury is so much farther from the earth at time of transit, and so much smaller than Venus in diameter, that it cannot be seen without the aid of a telescope, although easily observable with the smallest of them, protected with dark sun glasses.

The transit of Mercury on November 14 will be visible completely over all of North America except the northwestern part, South America, the Atlantic Ocean, eastern Pacific and Antarctica. In western Europe generally, and all of Africa except the eastern part, the sun will set before the transit ends, although the beginning will be visible in the late afternoon. In some northwestern parts of North America and parts of the central Pacific the transit will be partly visible, the sun rising with the planet seen, telescopically, crossing its disk.

The duration of the transit of November 14 wherever it is visible completely, from the point where it is in first contact with the disk of the sun at Ingress, as it is called, until it is in last contact at Egress is about 2 hours, 35 minutes. It takes about 3½ minutes for the planet to enter completely upon the disk of the sun and equally long to leave it. The transit begins in Eastern Standard Time at 10:37 A.M., and ends at 1:12 P.M. The corresponding Central Time will be one hour earlier, Mountain Time two hours earlier and Pacific Time three hours earlier, so that on the Pacific Coast the planet will begin its transit of the disk of the sun at 7:37 A.M. and end it at 10:12 P.M. Pacific Standard Time. These times are correct for all parts of the country to within less than one minute. Since a transit of the planet across the face of the sun always occurs at the time of inferior conjunction, when the planet is passing from east to west of the sun, its path will be from a point on the eastern edge of the sun to one on the western edge. It may pass almost centrally across the disk, or at almost any distance north or south of it up to merely a grazing contact with it. In the coming transit Mercury passes far to the north of the center of the disk from a point 51 degrees east of the north point of the sun's disk to a point 4 degrees west of the north point, thus tracing a short and very slanting path across the face of the sun.

Scientific observations of transits of Mercury are made, whenever possible, at all observatories interested in obtaining better elements of the orbit of the planet and better predictions of its positions in that orbit. Measurements of the diameter of the planet are also made at such times. This November transit is a particularly favorable one in this country, as it may be observable from beginning to end at all observatories, many in number, some of which should be favored with excellent observing conditions even if the weather should be disappointing in some sections. This will be true, also, of Canadian observatories in the East and others in Mexico and South America. Conditions will be less favorable, in western Europe.

The fact that Mercury has no atmosphere makes observations of this planet at transits more valuable than observations of Venus on the rare occasions when it transits the sun. Great preparations were made to observe the transits of Venus that occurred in 1874 and 1882. They were expected to furnish a valuable method for determining the solar parallax and distance of the earth from the sun, or astronomical unit. Scientific expeditions were sent out by different governments to favorable locations at considerable expense. The transit of 1882 was to be visible in the United States.

It is doubtful that any such efforts would ever be made again to observe Venus scientifically in transit of the sun, even if such transits were of frequent occurrence. Much better methods for finding the value of that important astronomical unit—the distance of the earth from the sun—have been found. The atmosphere of Venus destroyed all attempts to obtain any accurate measurement of the times of contact of the planet's disk with that of the sun. (Continued on page 498)

Planetarium

By JOHN GALLINARI WHIDDING

In this false heaven, where a lifeless night
Looms large above its sharp horizoned rim,
The stars cut capers on a moment's whim —
The moon departs its orbit — and the might
Of time is challenged as it halts in flight
And hastens back on stern command of him
Whose sun responds to buttons, growing dim:
Machined enchantment — marvelous delight!

Man is the clever creature! Not resigned
To be his Master's image, turned from clay,
He must out-build and over-reach the Mind
Whose tender thought devised the circling day!
He tampers now — so near his doomful end —
To ape the lightnings God forbears to send.

The School Page

By E. LAURENCE PALMER

Professor Emeritus of Nature and Science Education, Cornell University, and Director of Nature Education, The American Nature Association

TWIGS IN SCHOOL

MANY lessons have been taught in school with the help of a hickory stick. Different lessons may still be taught by one, and in this the special insert in this issue of *Nature Magazine* may help.

Twigs may be used in elementary and secondary schools to teach plant morphology and other things besides, and the twigs themselves can do the teaching better than can books. Let the children collect a variety of twigs that are available in the neighborhood. Some of these may be opposite budded. If so check them with the sixty-fifth of our special inserts for identification. If they are alternately budded the special insert in this magazine will be useful.

Identification is not the entire or sole opportunity presented by a winter twig. Here is how to learn a few things.

Bring twigs into the house, or the school room, from early fall through the winter, and keep them in water, or sprout them. Make a point of bringing one twig from the same tree or shrub once a week. Notice whether the buds develop as rapidily when collected in early fall, before a frost, or whether they do better after we have had a short session of winter. Keep records of the number of days necessary for your buds on the twigs to develop to a given point through the winter season.

Notice that when the buds develop some will develop into leaves and little branches while others may develop into flowers. See if you can predict which of the buds will develop into flowers and which into leaves, judging from what has been seen. If you want a nice bouquet of pussy willows it will pay you to know these differences. The same holds for forsythia, apple blossoms, peach blossoms and Japanese quince, as well as for many others.

Notice on the different twigs you have whether any of them develop flowers from the buds at the very tip, from the buds near the tip, or from buds well back from the tip. It is important to know this if for any reason you might wish to prune your woody plants to make them produce more or larger fruits. You would not want to prune off all of the flower buds if you wished to increase your number of fruits to be developed. Would you prune grape, or horse-chestnut, or lilacs in the same way? Which of these have similar flowering habits?

It will be interesting, if you sprout some twigs indoors in winter, to notice what happens when a bud opens; how the bud scales differ in their development and behavior; whether all of the bud scales of a given bud behave the same, or if some are merely shed while others develop into one or another kind of structure. There are few things in Nature more interesting than a developing bud, or a developing human being.

You might like to try a few things with your twigs in water indoors. For example, treat the cut end of the twig variously before putting it in water. Cut some off squarely, others on a slant. Cut some under water and others in the air. Let a few dry out before putting them in water. Cover the cut surface of some with paraffin, with vaseline, with paint, or char one to see if that makes any difference. Put the twigs in different kinds of liquids to see if that makes any difference, using water, milk, ink, gasoline and so on. You might even try putting things into the water to see if that helps. Try salt, sugar, flour and other common household commodities.

You might try breaking off a few buds on one twig and leaving a similar twig with a larger number of buds to see if the twig with the fewer buds develops more rapidly, or has larger leaves or flowers.

You should notice that on each of your twigs there is a series of scars indicating where the new year's growth started and where each preceding year's growth began or ended. Such a scar shows in the illustration of the pear twig. Do you ever find buds developing below the uppermost of these scars? Do they develop more commonly above or below the uppermost of these scars? Of course, you may find buds developing on side branches or side twigs below these scars, but these should not count in answering the questions raised above.

You may notice on the twigs that there are a number of irregularities that we have not discussed in our special insert. We made little of flower scars or fruit scars since they are of little importance in making an identification. They are, however, important in studying the story of twigs. On an apple tree, for example, you may find the short fruit spurs that leave a record each year about their activities. You can see that the twig bore a fruit last year or the year before. In fact, you can look back many years and find how literally fruitful that part of the tree has been. This is worth knowing, but could not be handled at this time. Maybe, if you are interested, I will help you later on that aspect of the situation.

Also our twigs will differ in the size, shape, arrangement and abundance of such things as the lenticels, or spots, through which the twig probably gets a supply of oxygen. Usually these are not of importance in making an identification. The nature of the bark of twigs also varies greatly, and many times this is of importance in making a species identification.

One thing is certain. If you get interested in studying twigs, the way I did for some years, you will find it a most intriguing experience. I used to carry a small box in my pocket in which I had single twig slips less than an inch long. These I used to help me learn to recognize the different species.

If you will carry your studies far enough you will learn that, while we can say that a given species may have a terminal bud, we may find examples where the bud is lacking. It may have been shed and the scar may have grown over completely. We will also find that it is not safe to say that because one member of a genus has a given character that all members of that genus have that character. We acknowledged this in connection with the genus *Rhus*, which includes our sumacs and poison ivy; in the case of our *Betulas*, which include the birches, and we might have given other examples.

Whatever happens, I can suggest with certainty that twig study is worth while academically, practically and esthetically. I cannot say that for all things that find a place in the average school curriculum, or in the average school text book.

Cedar out of Rock

By ADELE DE LEEUW

What sturdiness of long-enduring stock
Has made this cedar growing out of rock?
Spurning the forest soil, it claws through stone
And leans to sea, exultantly alone.
Its branches tossing in the wind-swept spray,
Dark majesty against the fragile day,
Its tortured shape is beautiful to see. . . .
I would to God there were such strength in me!

Pacific Marineland

Work has commenced on a mammoth oceanarium to be known as Marineland of the Pacific. This project, scheduled to be opened next spring, is on a 65-acre tract along the Palos Verdes Peninsula a few miles south of Los Angeles near Long Beach. Plans call for two huge tanks, one oval and the other circular, each holding 1,525,424 gallons of filtered and treated water from the Pacific. Henry U. Harris, New York investment broker, is president of the corporation building the oceanarium. The architects are Pereira and Luckman.

St. Paul Owls

Last spring a resident of one of St. Paul's residential areas complained to the police that she was being dive-bombed by owls as she walked along the sidewalk. Once she lost a hair net. This, of course, led to the usual vendetta against a little family of five-inch-high screech owls. The parents, of course, were only trying to avert supposed danger to their young. Over the protests of many residents of the area, one adult and four young were finally shot by two police detectives. The other adult apparently escaped. Earlier attempts to scare the birds away had failed, no doubt because the youngsters were not ready to take wing. So finally the "ferocious" birds were killed.

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Camera Trails

By

EDNA HOFFMAN EVANS

LAST month I wrote about the joys, sorrows, and frustrations of remote control photography. One of my conclusions was that in order to make the apparatus work properly I would have to find a large subject—say a bear or an elephant. I have not found either one, but I have found a man who has successfully photographed a king-sized bear by remote control. After looking at the bear's picture, I am certain that the only way I would care to photograph bears is by remote control—the more remote, the better.

Adrian Atwater, who made the bear's picture, is official photographer for the Nevada State Highway Department. He is within easy reach of the bear country for he lives in Washoe Valley, just twenty miles south of Reno, Nevada.

Here is the story of his experience.

Bears have made their homes in the rugged Sierra country between Lake Tahoe and Washoe Valley for several years, and residents of the Valley are accustomed to finding their garbage cans upset and rifled. It is also common for the sweet-toothed bruins to rob beehives in the area.

This is particularly true after a lean winter, when the bears apparently decide there are better pickings in the Valley. Residents find their garbage cans upset, trash scattered, and familiar tracks of assorted bears leading back into the Sierra. But the bear that interested Atwater was no ordinary fellow; it left paw prints twelve inches long. What a subject for a picture! The problem was how to get bear and camera together.

Atwater decided to experiment. He selected a site where three large garbage barrels offered a special inducement to nighttime visitors, and there he rigged up a Rube Goldberg contraption of photographic equipment in the hope of filming a bear in the act of larceny. Any bear would do, of course, but he particularly hoped for a picture of the big-footed fellow, who had been named "Old Granddad."

It would be foolhardy, he reasoned, to use an expensive camera in the experiment because there was no way to gauge a bear's reaction to a flashbulb. One swat of a paw could destroy the instrument. So Atwater borrowed a Brownie Hawkeye camera (price $7.50) with flashgun attached. Using old boards, string, and rubber bands, he fashioned a tripper. The contrivance was secured to an old tree stump about eight feet from the garbage barrels, which rested on a three-foot

"Old Granddad" pulled himself up for a full-length portrait only eight feet from the little camera.

platform. A string ran from each barrel to the camera so that if a barrel were tilted or the string touched, a peg would be released and the rubber bands would pull down the camera lever. The stage was set, the camera loaded with Eastman Super XX film, and a flashbulb inserted. Now, would it work?

The next morning Atwater found the barrels intact and upright, but the flashbulb had been fired. He took the film to his darkroom and developed it. A pine crow had alighted on the string and had taken its own picture. While this was not the type of game he had in mind, it proved one important thing—the set-up worked!

Another day and night of waiting and another flashbulb fired. Again the darkroom told the story. This time part of a cougar was visible as it jumped from the top of the barrel to the ground. The game was getting bigger.

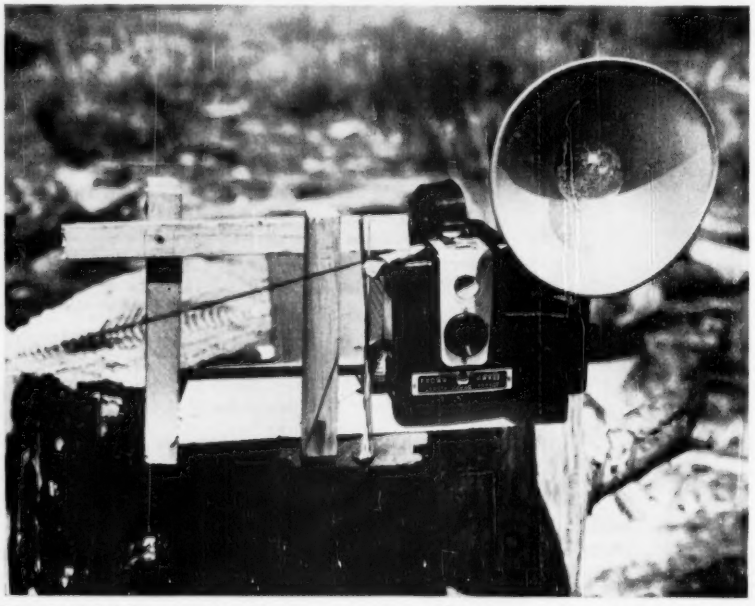
During the next three nights intruders kept the flashbulbs popping. The ranch collie, a house cat, an unidentifiable animal — possibly a fox — succeeded in "mugging" themselves. After this followed three nights of freezing rain; although there was evidence of visitors, the contraption had not worked.

Then came the long-awaited morning. The barrels were upset and the contents were strewn on the ground. Atwater observed the twelve-inch paw prints on the ground. This time he had really scored! He hurried to the darkroom and there on celluloid was the image of "Old Grandad" the bear—all seven feet of him.

There is a question as to which was more surprised, the bear by the flash of the camera, or Atwater when he looked at the film. As can be seen by Atwater's photograph, the bear cleared the top of the barrels, which rose to a height of six feet. The photograph also amazed Atwater's neighbors, for they had no idea that a bear of such size roamed the valley. They were aware of the nightly visits of the bruins, and they knew about "Old Granddad's" twelve-inch paws, but seeing his bulk in a photograph from a distance of eight feet was sobering.

Experienced wildlife observers studied the picture and estimated the bear to be more than seven feet tall and to weigh approximately eight hundred pounds. He tops the six-foot barrels at a leaning position. Atwater stood in the same position as the bear and had his picture taken—he is six feet tall and weighs 150 pounds—yet there is a striking contrast between his size and the bulk of the bear.

What are the opinions of the Valley residents regarding "Old Granddad" and his nightly prowls about their homes? Atwater reports that some are fearful of the huge beast, some are unconcerned,



This faithful Brownie Hawkeye and the Rube Goldberg tripper were responsible for capturing the bear's visit on film.

while others are glad to accept him as their "wildlife."

If "Old Granddad" continues to behave like a gentleman, he will probably live to a ripe old age in Nevada. The State does not have a season on bears and they can be killed only by the Fish and Game Department after citizens swear that a bruin is being overly dangerous or has become a pest. At any rate, he makes a fine subject for photography—by remote control. And that is Atwater's story.

Photographers interested in this type of picture taking will do well to study the photograph of the device Atwater used to fire his camera. It is simple, inexpensive, yet ingenious and capable of doing the job for which it was designed. Cameras with push buttons instead of shutter releases that can be pulled down by means of a loop of string have long been a problem when it comes to operating them by remote control.

The Hawkeye camera, it will be noted, has the release button on top. Thus, a method had to be devised to bring enough pressure down on it to take a picture. Atwater's device, using small boards in a square arrangement, with rubber bands to supply the necessary tension, did the trick.

For cameras with the release button in front, so that the pressure must be "in" or "back" instead of "down," the problem is somewhat more complicated. I will be interested in knowing whether any other "Camera Trails" reader has solved the problem of remote control photography with a camera having such a shutter release. I spent a day, not long ago, rigging up such a device for my Kine-Exakta. At a later date I will have more to say about that.

Meanwhile, readers, if you have solved the problem of getting your camera shutter released at the right time, and from a distance, I will be happy to hear of the details.

Reminder

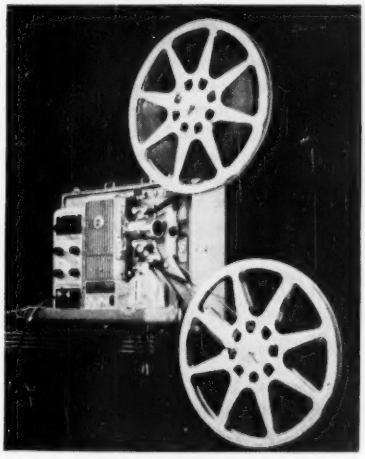
It is time to be thinking about photographic Christmas cards, if you plan to make some this year. There are still a number of weeks, of course, before they must be in the mail. None the less, you should be taking your pictures soon, or choosing the negative you want to use. Then, regardless of whether you make the prints yourself, or send the negative off to be printed by a commercial developer, the cards will be ready in time for early mailing to avoid the last minute rush.

Odds and Ends

There are a number of items to be noted in the motion picture field, both in the realm of home movies and in the field of visual education.

Two publications containing helpful how-to-do-it hints are available for the home movie maker. Bell and Howell Company, 7100 McCormick Road, Chicago 45, Ill., has a five-cent booklet entitled "Tips on Making Home Movies *Right* From the Start." This gives numerous valuable suggestions, beginning with a "dry run" practice session with the camera empty of film, so the operator learns to use his equipment before he wastes any film. One section is entitled "The hand that rocks the camera hurts the eyes"—a very apt observance as anyone who has tried to watch wobbly home-made movies will agree.

Eastman also has an informational bulletin called "Kodak Movie News," which is available free of charge to people whose names are on the mailing list. Write to: Editor, "Kodak Movie News," Eastman Kodak Company, Rochester 4, N.Y., if you want your name included. As originally planned, the bulletin is to be mailed on a bi-monthly basis. Plans call for five pages of how-to-do-it information and one page of full color reproductions of good shots by amateur movie makers. The information will be seasonal in content, and slanted to provide the maximum amount of helpful information to movie makers.



New model Kodascope Pageant Sound Projector, Model AV-151E.

In the audio-visual field, Eastman has announced three new models of the Kodascope sound projector, all designed especially to meet educational needs and developed from the Kodascope sound projector, Model 1, which will continue to be offered. One of the new machines, Model AV-071, provides an increase of 43 percent in screen illumination, and is designed for use in hard-to-darken classrooms, halls, or auditoriums. Model AV-151 features a 15-watt amplifier and separate 12-inch speaker that makes close sound control possible. The third machine, Model AV-151E, combines the special features of both machines to increase both brilliance and sound control.

In line with the new developments in the commercial motion picture field, Bell and Howell has developed a wide screen system with stereophonic sound for 16mm movies. The system is patterned after 20th Century-Fox's CinemaScope. The

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projected picture fills a curved screen 2.5 times as wide as it is high, an expanse which covers more nearly the normal field of vision of the human eye.

In the event that you are thinking of doing some high-powered mountain climbing, Eastman proudly reports that the men who reached the top of Mount Everest last May took pictures from the summit with a Kodak Retina IIa camera and Kodachrome film. In fact, all the cameras used by climbers who reached the 28,000-foot mark were Kodak Retinas.

The Du Pont Company has developed a fast orthochromatic sheet film, called High Speed Ortho, designed to meet the needs of portrait and press photographers who require a fast film. It has a very low red sensitivity, but a high blue and a fairly high green sensitivity, making it good for landscape and aerial views, as well as for studio and newsportrait work. The film is available at most camera shops.

THOMAS MAYO BREWER

(Continued from page 468)

inspecting their collections. He had an account of this trip in the *Popular Science Monthly* for August, 1877. In retirement, he got out a revised list of the birds of Massachusetts and numerous short articles, largely on that subject, but there were no more extensive works. His collection of birds' eggs was bequeathed to the Museum of Comparative Zoology at Harvard University.

Brewer assuredly did his full share in studying and compiling the biographies of American birds. Circumstances prevented him from publishing a comprehensive work with colored illustrations of eggs, but they have likewise thwarted all other authors with similar aspirations. There was some bad luck also connected with the naming of birds for him. One by Audubon, Brewer's duck, proved to be a hybrid; another by the same author had been earlier named by Wagler; but Brewer's memory is still preserved in its standard vernacular name — Brewer's blackbird. There remain in good standing: Brewer's sparrow, *Spizella breweri* Cassin, 1856, and also Brewer's mole, *Parascalops breweri* Bachman, 1842.

Thus the old-timers approved of him; after his visit with the Baird family in 1840, Spencer wrote, "We all liked him very much"; and despite the carping of some of the controversialists, the *National Cyclopaedia of American Biography*, in summary, notes that, "Dr. Brewer was greatly esteemed for his warm sympathy, loyalty to friends, and convictions of truth and duty."

PINHEADS OF THE SOUTH

(Continued from page 491)

waves break this primary egg sheet into a number of small sections, some of which may be one foot across. The development of the young within the egg is fortunately rapid, and in about three days the larvae escape. On hatching they fall to the bottom of the pond and begin a strange whirling swim by vibrating their tails and rotating on their own axes. This persists for one day, at the end of which the young larvae swim upward and hang just below the surface of the water. Soon the head broadens and the pigment of the skin darkens, after which they drop once more to the bottom and behave as do tadpoles of other frogs.

The eminent amphibiologist, Dr. Albert H. Wright, has described the tadpole of the narrowmouth frog as "our most remarkable tadpole." The tadpole differs from most others in being conspicuously flat rather than rounded, and in having a sucker-like mouth, lacking the usual lower lip typical of other types. Oddly they out-rank their parents in size, reaching a length of one and one-third inches.

After a period ranging from sixteen to sixty-seven days, the tadpoles transform into young frogs, which leave the parental pond or puddle and seek refuge beneath soil, boards, logs or leaves within a short distance of their place of birth. If all goes well and they are not destroyed by adverse conditions, or natural enemies, they will live for six or seven years, coming forth each summer to produce new generations of pin-headed rain prophets, and to herald approaching storms with their strange, mysterious bleating.

MERCURY TRANSITS THE SUN

(Continued from page 493)

The black drop of hazy outline that was Venus seen projected against a solar background was of no value for scientific observation of the times of Ingress and Egress of Venus at the edge of the solar disk. The results of the observations were given little weight.

The atmosphere of Venus has been troublesome to observers of this interesting planet in more ways than in this matter of transits. If it were not for its atmosphere we might have a better knowledge of what is taking place on the surface of Venus, so completely hidden as it is beneath the dense veil of its enshrouding gaseous envelope. If some markings could be detected on its surface one would be able to determine the length of the day of Venus, which is now unknown. With an atmosphere as rare as that of Mars, Venus might prove to be a more interesting planet to observe than ruddy Mars.

As the moon pursues its monthly course through the constellations of the Zodiac it temporarily passes in front of and "occults," or hides from view briefly, a number of stars, and also at times planets. The times of beginning and ending of these occultations of stars and planets by the moon furnish a valuable means for finding better tables for predicting the position of the moon in the heavens for any date. Accurate observations of the times of disappearance and reappearance of the star or planet are needed to improve the tables of the moon. Here again the atmosphere of Venus contributes its disturbing effect and makes the observations of this planet less reliable than the stars for this purpose.

The nearness of Mercury to the sun makes it a most difficult object to observe for one must look for it under most unsatisfactory conditions in the evening and morning twilight, according to whether it is east or west of the sun, and then it will be found only at or near the times of its greatest elongations, when the angular distance from the sun is at or near a maximum. Telescopic observers of Mercury have an advantage because they can screen off the glare of the sun and observe the planet in daylight, and at transits, and occasionally it is brilliantly in view at the time of a total eclipse of the sun—although then one has far more interesting things to observe than the planet Mercury.

Mercury becomes visible in the morning sky low in the southeast in the twilight by the end of November. It was not well placed for observation in the evening sky early in November, although at eastern elongation on October 23.

Venus remains a morning star low in the southeast at sunrise. It will be in conjunction with Saturn on November 13. Mercury and Venus will be in conjunction on November 23.

Mars is improving its position in the morning sky in Virgo and may be seen in the southeast for several hours before sunrise.

Jupiter is now in Taurus. It rises about two hours after sunset and is visible for the remainder of the night.

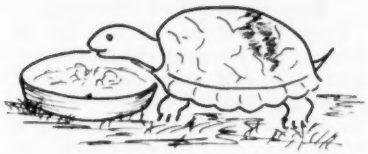
Saturn is in the morning sky in Virgo east of Spica, visible low in the southeast before sunrise. It will improve its position for observation during the month.

Mid-Century Conference

December 2 to 4 are the dates chosen for the Mid-Century Conference on Resources for the Future to be held in Washington, D.C. The conference is being called by Resources for the Future, Inc., a non-profit corporation for research and education in the field of natural resources. Its offices are at 1025 Connecticut Avenue, N.W., Washington 6, D.C., and the conference is made possible by a grant from the Ford Foundation. It is announced that the meeting is not to endorse any program but to provide a thorough opportunity for the exploration of all phases of the resource subject.

ANSWERS TO QUIZ

1-k; 2-m; 3-g; 4-c; 5-o; 6-h; 7-f; 8-j; 9-i; 10-e; 11-n; 12-b; 13-a; 14-l; 15 d



HERE COMES GREGORY

By Jo R. Williams

GREGORY is—or was—a turtle who visited me almost every day for two summers. One morning in the late spring I noticed the turtle in my back yard. I stopped to look at him, because he had an odd-looking scar on his brown-and-yellow shell. Deciding that he must have been burned, or hit by some vehicle, but had recovered, I was about to walk away. Just then he ventured his head out and began to eat something. To my surprise, his choice of food was some bread that had been soaked in milk and put out for the cats.

"This just can't be," I said.

But there he was, poking out that queer head and pecking away at the bread scraps.

The next morning, there was Mr. Turtle again, looking around expectantly. Amused by this second visit, I rushed back into the kitchen for food to offer the strange guest. Hoping to find something more appetizing for one of his kind, I put out some lettuce and other foods. He refused these and hid himself inside his hard back. When at last I brought milk-soaked bread and retreated far enough away to suit him, out popped his head, and he began eating. After finishing his meal, he waddled away and disappeared.

This morning call became a daily habit, so I decided my visitor should be given a name. One day, as he bobbed back and forth, I said to him, "I've got it! You shall be called Gregory because you Peck at your food." Sometimes the turtle appeared twice a day, and, although from time to time I tried to interest him in other foods, he always preferred the bread and milk diet.

When cool fall days began to chase away the warmth of summer, Gregory did not come as often. Finally his visits ceased altogether, and it was supposed that he had been seen for the last time.

The following spring came, and days began to warm again. One morning a rustling sound was heard in the edge of the tall grass that grew on the vacant lot just back of the yard. At last out came my turtle friend, still identifiable by the familiar scarred shell. Amazed, but happy to see him again, I dashed into the house for his favorite dish.

"Guess what! Here comes *Gregory*!" I called out excitedly.

And so he continued to come, almost daily, through a second summer. Since then he has not been seen, but I often wonder why he does not return. Perhaps it is because the tall grass was cleared away last spring, and he had to find another hiding place. On the other hand, he may have suffered ill health because he refused a more balanced diet.

Bounty on Wolverine

By overruling the Governor of Alaska's veto of a bill which establishes bounty payments on the wolverine, the Alaska Legislature not only has overlooked the time-proven uselessness of a bounty system of this kind, but has committed itself to paying for the destruction of an animal which is already at precariously low numbers in that territory, the Wildlife Management Institute reports.

Over the years, tales from the northwoods have attracted widespread attention to this largest member of the weasel family. The wolverine either may be admired for its strength and resourcefulness, or paradoxically, despised as a raider of traplines and a despoiler of mountain cabins. The value of its handsome brown fur as well as the enmity borne the animal by some hunters and trappers have resulted in its extinction over much of its original range.

No protection is given the wolverine in Alaska, and it may be killed without restriction along with coyotes, wolves, squirrels, and marmots. Persons who dislike the wolverine attempt to destroy every one they encounter, and their actions have accelerated greatly the disappearance of the animals. While the decision of the Alaska Legislature has done little more than ear mark public funds for those people who begrudge living space to the wolverine, it has focused attention on the gross mismanagement of a native North American animal.

Conservation Sketchbook

From the Missouri Conservation Commission, Jefferson City, Missouri, comes a sequel to the "Conservation Sketchbook" published in 1950. This is a collection of the fine picture stories of Nature drawn each month for *The Missouri Conservationist* by Charles W. Schwartz. Within Missouri this booklet is available for a dime, outside for two dimes, and well worth the investment.

Flicker Takes Over

From Aylesford, Nova Scotia, W. A. Brown reports a quirk of Nature. For some years robins have been building and raising their families in nests built under the overhang of Mr. Brown's bungalow. After the robin had raised two broods this year a flicker took over the nest, sitting in it nights. Mr. Brown feels that this may be partly due to fewer flicker nesting sites since some 90 percent of the old apple trees in the orchard have been cleared out. Also tree swallows have found it more difficult to find nesting sites.

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Wildlife Conference

The responsibilities of individuals, communities, organizations, and government agencies in creating and sustaining practical, continent-wide natural resources programs will be emphasized at the 19th North American Wildlife Conference, which will be held in Chicago, Illinois, next March under the sponsorship of the Wildlife Management Institute. Attention will be focused on the most urgent resource problems facing North America today. No phase of conservation and restoration of natural resources has been omitted from the broad program, which will include discussions by international leaders and qualified experts on subjects ranging from the basic resources of soil and water to the management of their living products. Wise use of all renewable natural resources will be stressed in the nine sessions of the three-day meeting. Never before in history has a greater need existed for a definite evaluation of our present and future policies toward these natural assets.

Aid to the States

Under the provisions of the Pittman-Robertson Act, which provides that income from the excise tax on arms and ammunition be earmarked for cooperative expenditure with the States in wildlife restoration and development, $11,784,600 will be available from the Federal Government during the 1954 fiscal year. These Federal grants must be matched with not less than a 25 percent State contribution for approved projects. Under the Dingell-Johnson Act, which applies a similar formula to the excise tax on fishing tackle, $4,299,916 will be available for fish restoration work. Both amounts represent a substantial increase over funds apportioned for the 1953 fiscal year.

Naturalists' Directory

From Salem, Massachusetts, comes word that the publishers of *The Naturalists' Directory* are compiling the 37th edition of that publication, which first appeared in 1875. This book lists naturalists and their interests in all parts of the world, and includes lists of natural history museums, zoos, periodicals and dealers. Anyone interested in having his name included should write the publisher.

Colorado Flowers

Latest addition to the "Museum Pictorial" series published by the Denver Museum of Natural History, Denver, Colorado, is entitled "Some Common Colorado Wild Flowers" and is the work of Harold and Rhoda Roberts. This 64-page booklet is fully illustrated in color and sells for $1.25. The entire series, numbers one to nine, all of which have been noted earlier in our pages, is available for $4.50, and is a worthwhile investment.

Sending the above photograph, Jesse D. Brown of Greenville, S. C., writes that while a robin was building its nest in the Brown's yard, a piece of string became entangled on a limb and wound about the bird's neck. It had hung itself before human aid could reach the robin and free it.

Bennett to Pennsylvania

After five years as chief of the branch of wildlife research of the United States Fish and Wildlife Service, Dr. Logan J. Bennett has resigned to accept the appointment as executive director of the Pennsylvania Fish and Game Commission. With the Federal agency he established an outstanding reputation as both administrator and scientist, and carries these qualifications to the important post in Pennsylvania.

Wildlife Directory

From the National Wildlife Federation, 232 Carroll St., N. W., Washington 12, D.C., comes the "Directory of Organizations and Officials Concerned with the Protection of Wildlife and Other Natural Resources." This is a most handy booklet to have at one's elbow. Copies are available for twenty-five cents from the address given.

Sea Isle Wildlife

"Seashore Wildlife at Sea Isle New Jersey" is the title of the latest bulletin prepared by Henry H. Collins, Jr., and published by the Caribou Press, Box 236, Bronxville, New York. It is a 16-page, illustrated booklet the contents of which are indicated by the title. There is no price evident, but we gather that it is available on request to the Office of the Mayor, Sea Isle City, New Jersey. Sea Isle is one of the barrier beaches that guard the south Jersey coast and it is an area particularly rich in wildlife resources.

Bird Committee Meeting

From May 23 to 28, 1954, The International Committee for Bird Preservation will hold a meeting at Scanfs, Lower Engadine, Switzerland. The meeting will immediately precede the sessions of the International Ornithological Congress opening in Basle on May 29. The gathering of the International Committee will open with an evening session on Sunday, May 23, sessions continuing through May 26. Following the formal close of the meeting there will be an all-day excursion in the Swiss National Park, and an excursion to the ibex colony en route to Basle. Those planning to attend these meetings are urged to make travel arrangements early.

Evelyn Hendricks

Many readers of *Nature Magazine* will recall the two articles (October, 1945, and August-September, 1952) about Evelyn Hendricks of Nash County, North Carolina, who, although crippled by rheumatoid arthritis, became a naturalist, artist, writer and research worker. In the latter field she made significant contributions to studies of the hereditary aspects of her affliction. On July 20, 1953, Miss Hendricks received from Governor Umstead of North Carolina, a medallion, a gold trophy and a tribute as the outstanding handicapped North Carolinian for 1953. She is thus in line for the nationally handicapped award.

Garden Lessons

Month by month the National Garden Institute, 1368 N. High Street, Columbus 1, Ohio, has issued a most helpful and practical little leaflet entitled "School Gardengram," written by Paul R. Young. Recently, however, someone had the happy idea of putting these past leaflets together in a 106-page, paper-covered book under the title of "Elementary Lessons in Gardening." While the text was originally, and still is, slanted for use by the teacher and school child, the information is just as useful to the average gardener. At one dollar this publication is a notable bargain.

Conservation Aids

From the U. S. Forest Service, U. S. Department of Agriculture, Washington 25, D.C., come a number of excellent conservation teaching aids. Single copies of these are available free to teachers, although the supply does not allow quantity distribution. We are happy to list the following: "What the Forester Does for Wildlife," "Suggested Questions for a High School Conservation Quiz," "Forest Service Films," "Materials to Help Teach Forest Conservation," "Forest Insects and Diseases," "Suggestions for Integrating Forestry in the Modern Cirriculum," "How Man Starts New Forests," "The Big Three; Water, Grass, Trees; Playlet for Children."

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UNDER THE MICROSCOPE

By JULIAN D. CORRINGTON

INTERNAL AMEBAS

IF FATHER and mother took a course in biology back in the days when Fred Astaire was dancing with his sister Adele, they may have read some brief reference to amebic dysentery. This human ailment, due to infestation by a relative of the much-studied *Amœba proteus*, was cited as an interesting example of parasitism by a protozoan, and dismissed as being unimportant to inhabitants of the United States since it was a "tropical disease." How ominous this term! At the time it conveyed a vague notion of unnamed, insidious, and dreadful terrors of the torrid zones of the world, mostly affecting native populations in unsanitary surroundings, without benefit of modern plumbing or knowledge of personal or community hygiene.

How different the picture today! The summer, 1953, issue of Sharp & Dohme's *Seminar* features a cover design of a slicing knife and some appetizing raw vegetables as accompaniment to the lead article, *Amebiasis*. Lederle's *Bulletin Newsletter* for June, 1953, is entitled *Amebiasis*. The newer texts in general zoology, protozoology, or parasitology devote from one to many pages to this subject—33 pages in Craig & Faust's *Clinical Parasitology*—and the reason for the changed attitude toward these internal amebas becomes at once apparent when we read that there are twenty to thirty million cases in the United States, that the disease is widespread in all sections and in all strata of society, and is steadily on the increase. Indeed, it is high time to divert a bit of the attention given to cancer and polio and invoke greater publicity for this topic so that a better understanding on the part of the reading public may lead to more effective control of a very real and important danger.

Amebiasis (pronounce it to rhyme with "Sammy, *try* a kiss") is the proper name today for the infection, inasmuch as actual dysentery occurs in only a small proportion of cases, so that the term "amebic dysentery" does not cover the majority. The suffix "iasis" (*eye*-a-sis) is now used for nearly all invasions by animal parasites, added to the name of the genus, as in trypanosomiasis, tæniasis.

The causal organism is *Endamœba histolytica*. This is one of six internal amebas: *Endamœba gingivalis* in the mouth and the other five in the intestine. These are: *Endamœba histolytica, Endamœba coli, Endolimax nana, Iodamœba williamsi* (*bütschlii*), and *Dientamœba fragilis*. Because of the fact that an individual showing some of the numerous and varied symptoms of amebiasis may owe these to other causes, and coincidentally may harbor one or more of these five species, it is essential as a first step in diagnosis that the presence of *Endamœba histolytica* be established through a microscopic examination of stool specimens.

Trophozoite of *Endamoeba coli*, 1900X.

Majority opinion at present indicates that *Endamœba coli*, *Endolimax*, and *Iodamœba* are harmless commensals, living on bacteria, starch grains, plant cells and other intestinal debris, but not upon blood cells or other tissues of the host. Some investigators, however, feel that a heavy infection with any of these amebas will bring on digestive disturbances. One man reported a fatal case apparently due to *Iodamœba*, and a number of instances of diarrhea accompanied by a lowering of vitality have been charged against *Dientamœba*. However, none of these are significant when compared with the ravages of *Endamœba histolytica*, and are commonly dismissed as of minor importance.

Amebiasis is one of those diseases that vary in severity of symptoms all the way from negative to highly alarming. You may have it for years and never know it, or you may come down quickly with acute reactions. There may be either constipation or diarrhea, the abdomen may be tender or not, painful or not; there may be headaches and nausea, or just sleepiness, irritability, fatigue, and general malaise. As will be seen from this partial list, diagnosis must depend upon finding the organism in the stools, and here the microscopist, in the person of the medical technologist, plays a leading role. The suspect patient is given a saline purge and the liquid specimen examined promptly for the active and motile phase of the parasite, the *trophozoite* (feeding-animal). Also the formed stool is inspected for the inactive *cyst*, and various other tests and examinations may be ordered by the physician. Possibly as many as 80% of infected cases are detected upon first examination, provided the laboratory technician is competent and experienced.

Endamœba histolytica was first found in 1875 at St. Petersburg, Russia, which is almost as far from the tropics as one can get. Lösch, the discoverer, described the protozoan as *Amœba coli* and did not regard the fact that he was performing an autopsy as cause and effect. Details came later, and there was controversy over the spellings *Endamœba* and *Entamœba* with regard to the law of priority in naming, and whether or not our subject is in the same genus with a parasite of the cockroach. A recent text on Protozoology (Hall, 1953) goes back to *Entamœba*, but the parasitologists stick to their *Endamœba*, each citing good reasons and authorities for their opinions.

The trophozoite is much smaller than the free-living *Amœba proteus*, yet is amply large for spotting under the 16 mm lens, the average being 25 micra, the range from 8 to 60 micra. *Amœba proteus*, by contrast, averages 600 micra, twenty-four times the average size of *E. histolytica*. In stained preparations made by the Schaudinn-iron hematoxylin technique, the cytoplasm is grayish, nearly colorless, and so is the bulk of the vesicular nucleus, itself just a bit larger than a human red blood corpuscle. *Vesicular* indicates that the nucleus appears empty. The nuclear membrane is a fine black line and the chromatin is collected upon its inner surface as a band of intense black, composed of very fine granules. In or near the center of the nucleus is the small black *endosome*, termed the nucleolus in older descriptions. Surrounding the endosome is a clear zone, then a fine linin network, commonly radiating like the spokes of a wheel. Such a construction is characteristic of this species alone; other internal amebas present pictures

differing in one detail or another. However, the specimen must be fixed from very fresh preparations as otherwise some of these features change.

The trophozoite feeds almost exclusively on red blood corpuscles and numbers of these are generally present within food vacuoles. Other amebas do not ingest red cells, so the finding of these inside an intestinal ameba automatically dubs the specimen *E. histolytica*. Reproduction is by fission or a form of mitosis, said to involve six chromosomes.

When preparing to encyst, the trophozoite rounds up and ceases its customary rapid locomotion. Food vacuoles are eliminated, reducing the size, and in their place there may appear rodlike or oval *chromatoidal bodies*, black in stained slides, and vacuole-like spaces containing *glycogen*, both representing stored food. These are often present in the *precystic stage*, but disappear as the cyst grows older. Now a cyst wall is secreted and the nucleus divides, then the daughter nuclei divide again, producing the typical complement of four nuclei in the mature cyst. Rarely in this species are there eight nuclei, the normal and diagnostic number for the cyst of *E. coli*.

The trophozoites do the damage to the host tissues but are not infective when passed from the body, as they have no protection and die quickly when exposed. The cysts do not feed and can do no harm to the host, but are passed to the outside, where the cyst wall confers protection under many circumstances, and it is these forms that are picked up by new hosts, starting a new cycle of infection. Individuals with mild or symptomless cases are thus known as *carriers* or *cyst-passers*.

Transmission may occur in a variety of manners. Brown lists these as ingestion of cysts from "feces, fingers, food, fluid and flies." This alliterative assembly points up the necessity for greater care against pollution of drinking water, the employment of infected individuals as food-handlers in restaurants, scrupulous personal hygiene, and elimination of the house fly, that dangerous carrier of many infections (this Department, Oct., 1952).

One hears of the risk in tropical countries of eating raw vegetables. Among the greatest of these hazards is the possibility of contracting amebiasis and the connection lies in the use of night soil from human sources as fertilizer. Cyst-passers can in this way unwittingly spread their infection to the tourist, who pauses for a lunch that includes a salad. In the United States there may be, in any specified area, a high incidence of infection and of cyst-passers, but as other fertilizers are used, raw vegetables are safe to eat.

When cysts are swallowed, they pass unchanged through the stomach and upper portion of the small intestine. During their journey through the lower small intestine (*ileum*), secretions render the cyst wall permeable and the ameba comes forth (*excystation*). The four nuclei divide so that eight small daughter amebas result from each cyst; or, according to other investigations, four amebas come from each. These are the *metacystic trophozoites*, and they grow and divide continously, multiplying the infection. Many of the new trophozoites will penetrate the mucous membranes of the host, secreting a substance that dissolves the epithelial cells and results in liberation of blood, the red cells of which are then engulfed by the invaders. These primary attacks do not occur in the ileum, however, the excysted amebas passing along into the colon. Here the favored sites of invasion are, in order of incidence, caecum, ascending colon, rectum, sigmoid, and appendix. So often are supposed cases of appendicitis due to this organism that some specialists believe that every such case should be examined for amebiasis.

The amebas make flask-shaped ulcers which may heal spontaneously or may go on to involve deeper layers or even all layers of the colon. By metastasis through embolism, the protozoans may, like cancer cells, be swept away in the blood stream to lodge in other sites, the next organ attacked being the liver, where amebic abscess may run the gamut from minor to serious to fatal results. The brain, lungs, kidneys, and skin may also become involved.

All races of mankind are susceptible, but for some reason not yet discovered, men are much more liable to infection than women. Treatment is by drugs and antibiotics, no one of which is at present considered the perfect amebicide. As usual, prevention is the more important line to follow in looking toward elimination of this dangerous enemy of mankind.

APPLE POLISHER

The Newer Texts in Comparative Anatomy

MOST basic of all courses in the zoological curriculum, after the introductory survey, is comparative anatomy. It is essential as ground work in nearly all other fields and is held to be without a peer as a stimulating mental trainer for the non-biological major as well. The following brief reviews of the newer texts may prove useful to certain groups of our readers.

Adams, Leverett A. (Illinois), *Introduction to the Vertebrates*, Wiley, N. Y., 2d edition, 1948; pp. vii, 479, figs. 327; $4.50. For one-semester course. Has survey of chordates, brief treatment of embryology, glossary, bibliography. Sectional headings boldfaced, but technical terms not emphasized by any distinctive printing; difficult to locate when sought as reference. Pen drawings, many original; good. Systemic treatment followed by organismal; a section containing one chapter each on fishes, amphibia (Ambystoma as type), reptiles (Scelo-

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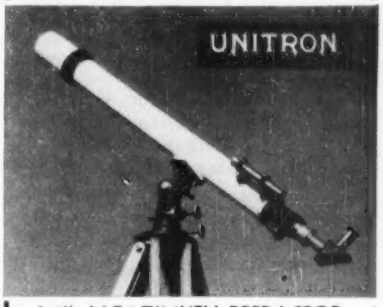

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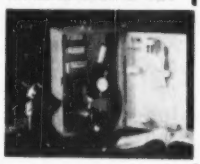

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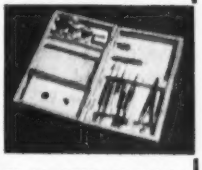

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porus), birds (Gallus), and mammals (rat). Straight factual writing with excellent coverage. Print good.

Adams and Samuel Eddy (Minnesota), *Comparative Anatomy*, Wiley, N. Y., 2d edition, 1949; pp. vii, 520, figs. 364; $5.00. A slightly larger work than the preceding, suitable for two-semester course and as reference. Has survey of chordates, chapter on embryology, glossary, bibliography. Sectional headings boldfaced, but technical terms not set off by any distinctive type. Pen drawings, mostly original; good. Systemic treatment with double coverage; first, general, followed by analysis by groups. Straight descriptive writing, authoritative, good analysis and coverage; tables. Print not as attractive or as easy to read as preceding; our preference is for the older, shorter volume.

Eaton, Theodore H., Jr. (East Carolina College), *Comparative Anatomy of the Vertebrates*, Harper, N. Y., 1st edition, 1951; pp. viii, 340, figs. 332; $4.00. For one-semester course. Has survey of chordates, chapter on embryology, bibliography. Sectional headings and technical terms boldfaced. Illustrations mostly pen drawings, many original by author; very good. Phyletic tree and geological scale inside covers. Systemic treatment; style interesting, often personalized. Final chapter on history, theories of origin, and panoramic survey. Organization, format, and printing superior.

Quiring, Daniel P. (Western Reserve), *Functional Anatomy of the Vertebrates*, McGraw-Hill N. Y., 1st edition, 1950; pp. xi, 624, figs. 257; $5.50. For two-semester course or reference. Has survey of chordates, glossary, references. Sectional headings boldfaced, technical terms italicized. Illustrations include many new and interesting animal photographs; pen drawings, some original, fair. Phyletic trees are wrong, without embryological basis. Systemic treatment, emphasizing physiology; weak on embryology and paleontology. Includes accounts of hunting and dissecting whales in Artic and big game in Africa; romantic and interesting, with some justification as a way of relating living animals at different energy levels to laboratory anatomy; tables of body and organ weights; possibly out of place in beginning morphological text. Final chapter on functional anatomy. Style personalized, interesting. Print good.

Rand, Herbert W. (Harvard), *The Chordates*, Blakiston, Philadelphia, 1st edition, 1950; pp. xi, 862, figs. 609; $6.00. For two-semester course and as reference. Sections headed with small caps, technical words boldfaced. Illustrations mostly drawings, based on Neal & Rand's well-known earlier volumes, generous in quantity, poor to excellent. Plan different from others; systemic first, with descriptive rather than comparative anatomy, then systematic, with comparative, functional, and taxonomic treatments. Prologue on why vertebrates should be studied; epilogue on what comes from this study; chapters on history, methods and aims of comparative anatomy. Imaginative writing, complete and authoritative. Paper, format, and printing superior.

Romer, Alfred Sherwood (Harvard), *The Vertebrate Body*, Saunders, Philadelphia, 1st edition, 1949; pp. viii, 643, figs. 363, 8 in color; attractive cover in color photography; $5.50. For two-semester course and as reference. Has survey of chordates and separate chapters on embryology and histology, glossary, bibliography. Sections boldfaced, technical terms italicized. Pen drawings, some original, fair to good. Systemic treatment emphasizing paleontology where possible; proper attention paid to physiology, embryology, histology, affording well-rounded, adequate coverage. Style good, somewhat personalized, authority outstanding. Paper and print excellent.

Walter, Herbert E. (formerly Brown) and Leonard P. Sayles (C.C.N.Y.), *Biology of the Vertebrates*, Macmillan, N. Y., 3d edition, 1949; pp. xix, 875, figs. 727, frontisp.; $6.00. For two-semester course and as reference. Section headings boldfaced, technical terms italicized. Pen drawings very numerous, mostly borrowed, mostly excellent. Has survey of chordates and separate chapters on chorology plus ecology, paleontology, anthropology, cytology, histology, embryology, and pathology; bibliography. Bulk of book is comparative anatomy on a functional basis, systemic treatment. Revision by junior author of the late Dr. Walter's well-known text, celebrated for its humorous and interesting style as well as for its encyclopaedic and exact coverage. Print and paper excellent.

Weichert, Charles K. (Cincinnati), *Anatomy of the Chordates*, McGraw-Hill, N. Y., 1st edition, 1951; pp. vii, 921, figs. 506; $8.00. For two-semester course and as reference. Sections boldfaced, technical terms italicized. Illustrations are both drawings and photographs, mostly original, fair to good. Has survey of chordates, chapter on embryology and histology, summaries at end of each chapter and at end of book. Both systemic and systematic treatments. After detailed survey of each organ system, Part III has four chapters consisting of dissections of lamprey, shark, necturus, and cat. Straight descriptive writing; accurate, thorough. Good paper and print.

Weichert, Charles K., *Elements of Chordate Anatomy*, McGraw-Hill, N. Y., 1st edition, 1953; pp. vii, 451, figs. 256; $5.50. For one-semester course; condensation of preceding. Has survey of chordates and chapter on embryology. Same printing, style, illustrations as preceding; does not include systematic treatment, which is published separately.

Previously reviewed: Atwood, *A Concise Comparative Anatomy* (March 1949 issue), and Messer, *An Introduction to Vertebrate Anatomy* (June-July 1948).

SONGS FOR ZOOLOGY

Leave The O Out of Cœlom

(Knock the L Out Of Kelly)

If I leave the O out of cœlom,
It will still be cœlom to me,
For a one-vowel E
Or a diphthong OE
Sound just the same in your Zoology.
Knock out the O from amœba,
Still amœba it always would be,
But, if I leave the O out of cœlom,
Sure they'll hang a D onto me.

BARGAIN DIATOMS

AMONG a number of advertising brochures sent out by Harry Ross, 70 West Broadway, New York 7, N. Y., we noted some exceptional values in arranged diatom slides. These are "type slides"—that is, slides with a succession of named forms of diatoms, arranged in one or more rows on a slide and accompanied by a key list. Diatomaniacs use these for identification and reference, comparing species and varieties from various localities. Ross lists 10 forms for $1.00, 25 for $2.50, and 50 for $4.00, all 50% or more off the usual cost.

NEW BOOKS

Microtechnique

ALWAYS a leader in its field, the fifth edition of Guyer's *Animal Micrology* continues this important work along the same lines as its predecessors, which reach as far back as 1906. While the arrangement is much the same as before, some of the older techniques have been removed to make room for newer methods. The Appendices continue to provide a large portion of the utility of the book, and Appendix C—methods of preparation of tissues and organs in systematic order—has been revised by Dr. Pearl E. Claus.

The dioxan method rates a separate chapter, as in the 4th edition, and there are remarks on such new instruments as the reflecting microscope and electron microscope, together with new fixers and stains. Dr. Guyer's book is primarily cytological and histological, and so does not include botanical or other non-zoological subjects, and continues to relegate the difficult art of whole-mounting to a minor place. There are larger, encyclopaedic works, but for students at the college level there is no finer or more authoritative text or guide in its subject area than Guyer. Pp. xviii, 327; figs. 76. Univ. of Chicago Press, 5750 Ellis Ave., Chicago 37, 1953. $4.75.

Out of the Dark, a Red Grenade

IT WAS AN APRIL NIGHT and the Marines, near Panmunjom, were under heavy attack. In one of E Company's machine gun emplacements, Corporal Duane Dewey and his assistant gunner lay on the ground, wounded. A Navy Medical corpsman was giving them aid.

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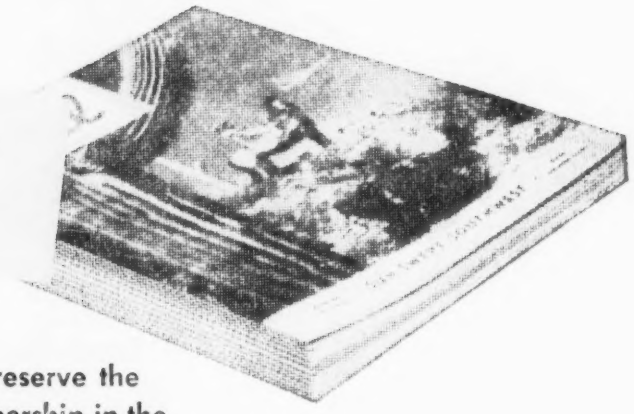

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